INSTALLATION AND OPERATING INSTRUCTIONS

Temperature and Climatic Test Systems

VTL 4003	VCL 4003	VCL 0003
VTL 4006	VCL 4006	VCL 0006
VTL 4010	VCL 4010	VCL 0010
VTL 7003	VCL 7003	
VTL 7006	VCL 7006	
VTL 7010	VCL 7010	

With Mincon/32-Controller

Table of Contents

1) option
2) climatic test systems only

1) option
2) climatic test systems only

1) option
2) climatic test systems only

1) option
2) climatic test systems only

GB VCL10EH032005
Buch_GB 032005IVZ.fm

1 INTRODUCTION

1.1 General information

This manual shall be read carefully prior to operating the test system in order to avoid malfunctioning and resultant damage.

This manual contains detailed information and directions regarding

– Installation

– Operation

– Mode of operation

– Faults

– Fault rectification

• Please observe the separate operating manual for the control unit

• Please observe the operating instructions for options in the appendix

1.2 For your guidance

Explanation of the signs and symbols:

1.2.1 Symbols

– A dash is used for enumerations

• A dot denotes directions which must be followed by operator and user

→ cross-references are preceded by an arrow

1.2.2 Danger warnings

consist of explanatory remarks with a symbol right next to it.

DANGER
is used, if non-compliance with the instructions may endanger living beings or the environment.

WARNING
is used, if non-compliance with the instructions may cause damage to the test system or test specimen.

NOTE
is used to indicate any form of assistance.

1) option
2) climatic test systems only

1.3 Separate operating instructions

Please observe the separate documentation for the following equipment:

- Control unit »Mincontrol«
- Control unit »Touchpanel«[1)]
- Printer[1)]
- Interface converter[1)]
- Software SIMPATI[1)]

1.4 Warranty

- The design of the test system as supplied by us must not be altered
- No warranty can be given in case of improper use contrary to the instructions in this manual
- The test system has been designed, manufactured and inspected before delivery with all due care in accordance with the EC guidelines as per enclosed declaration of conformity
- The test system meets the standards for conducted and emitted interference specified in the declaration of conformity
- It is imperative for the safety of the test system that the necessary maintenance and repair work should be performed by our service organisation or authorized service outlets
- The user himself can service and clean the test system in accordance with the maintenance schedule → *8.3 (page 46)*
- Only use original spares when performing maintenance or repair work
- For translations into other languages the statements and specifications of the German operating instructions are binding

1) option
2) climatic test systems only

1.5 Normal use and application

The test system has been designed and constructed exclusively for temperature and climatic tests.

You can perform testing methods to determine the effects of temperature and humidity on the material properties and reliability of a test specimen.

DANGER

Improper and inadmissible use of the test system means e.g.:

– Placing inflammable or explosive gases, dusts or fluids inside or in the vicinity of the test system.

– Placing inflammable, explosive, toxic or corrosive test specimens inside or near the test system.

– Placing test specimens, which become potentially hazardous when exposed to the temperature range of the test system, in or near the test system.

– Placing substances, which can create an explosive atmosphere with air, inside or in the vicinity of the test system.

– Endangering living beings by allowing them in the test system

– Using the test system for heating or storing food

1.6 Safety

1.6.1 General information

Certain basic rules must be observed even with reliable safety devices.

Improper and inadmissible use may represent a danger to life and limb of the operator or third parties or result in destruction of the test specimen or the test system.

- Do not remove protective covers
- Do not render safety devices ineffectual
- Do not manipulate safety devices

Such manipulations are particularly dangerous as others know nothing about them and have confidence in the safety of the test system.

1) option
2) climatic test systems only

1.6.2 Requirements to be met by the user

– Operation of the test system may only be performed by trained personnel

– The user must compile operating instructions on the basis of this manual, taking the relevant local and plant-internal conditions and the language of the operating personnel into account.

– The user must ensure that all personnel working with the test system know and observe the safety instructions

– Work on electrical devices and the refrigerating unit must be performed by our service or a skilled person authorized by us. The necessary documentation is in the Service Manual and should only be used by these persons.

The user must ensure that the directions regarding installation and operation of refrigerating plants as per EN 378-1 chap. 5.3, EN 378-2, appendix C, EN 378-4 chap. 4 and 5, are duly observed.

1.6.3 Definition of a skilled person

Personnel who, based on their training and experience are in a position to prevent electricity-related potential hazards or dangers connected with the refrigerating unit.

1) option
2) climatic test systems only

1.6.4 Safety symbols

Please observe the safety symbols on the test system:

OPERATING AND SAFETY INSTRUCTIONS

- Carefully read the operating instructions before putting the test system into operation
- Observe the safety instructions when operating the test system

WARNING ABOUT DANGER AREAS

- Observe the danger warnings in the operating instructions

WARNING ABOUT DANGEROUS ELECTRICAL VOLTAGE

Work on these devices to be performed by electrical experts only

- Set the mains switch to »O«

WARNING ABOUT PLUG-AND-SOCKET CONNECTIONS

Connectors may only be plugged if the test system is switched off

WARNING ABOUT HOT SURFACES

The air in the test space as well as the parts exposed to it may be extremely hot

- Wear safety clothing (gloves, face guard)

WARNING ABOUT COLD SURFACES

The air in the test space as well as the parts exposed to it may be extremely cold

- Wear protective clothing (gloves, face guard)

WARNING ABOUT HAND INJURIES

The heat exchanger fins are sharp-edged

- Wear protective gloves

NOT FOR DRINKING

Demineralized water is required for climatic operation

Demineralized water is not drinkable

1) option
2) climatic test systems only

1.6.5 Safety instructions

- Read first the operating instructions for the control unit
- Keep the operating instructions near the test system
- In addition to these operation instructions, the relevant national laws, regulations and directives must be observed when installing and operating the test system.
- In case of electrically connected test specimens the local and/or national safety regulations must be observed, particularly with regard to the equipotential bonding for leakage currents which may be caused by the test specimens.
  If leakage currents > 16 A can occur, an external equipotential bonding conductor for the test space must be provided on site.
- Heat-emitting test specimens must be disconnected if the test system is switched off (fire hazard). The test space is only protected against excess temperatures if the test system is switched on.
- Prior to closing the test space door, ensure no one is inside.

Maintenance work

- Set the test system to room temperature
- Set the mains switch to »O«
- Padlock the mains switch against accidental switching on
- Provide a safety clearance of > 500 mm between test system and wall, as escape route, in accordance with VDE 0100 Part 729.
- Do not use sharp tools for maintenance work
- Wear safety gloves

When using the entry ports

- Observe the safety standards for electrical systems, e.g. IEC 60364-4-41, VDE 0100 part 410 and EN 60204 part 1, as well as the relevant accident prevention regulations.
- Only use lines that are resistant to temperature and humidity
- Seal the used entry ports with temperature and humidity-resistant material

Refrigerants

The refrigerants used (→ *rating plate*) belong to group L1 according to EN 378. They are not inflammable, nor are they harmful to humans. Refrigerants are heavier than air. Leaking refrigerants will, therefore, accumulate around the floor.

- Should refrigerants be released, please notify our service department or a skilled person authorized by us. Ensure that the site is well ventilated.
- Observe the safety data sheets in the Service Manual.

1) option
2) climatic test systems only

1.6.6 Safety devices

– Protection against non-permissible temperatures

– Pressure switch (protection against non-permissible pressure in the refrigeration circuit)

DANGER

The safety devices are only working if the test system is switched on

The safety devices disconnect the test system permanently under the following circumstances:

– Overtemperature in the test system
(thermal safety class 1 in accordance with EN 60519-2, 1993)

– Thermal overstressing of the test specimen
(thermal safety class 2 in accordance with EN 60519-2, 1993)

– Overtemperature in the humidification basin

– Excess pressure in the refrigeration circuit

The test systems can be equipped with options. For relevant safety directions see the respective appendices.

1) option
2) climatic test systems only

1) option
2) climatic test systems only

2 DESCRIPTION OF THE TEST SYSTEM

2.1 Structure

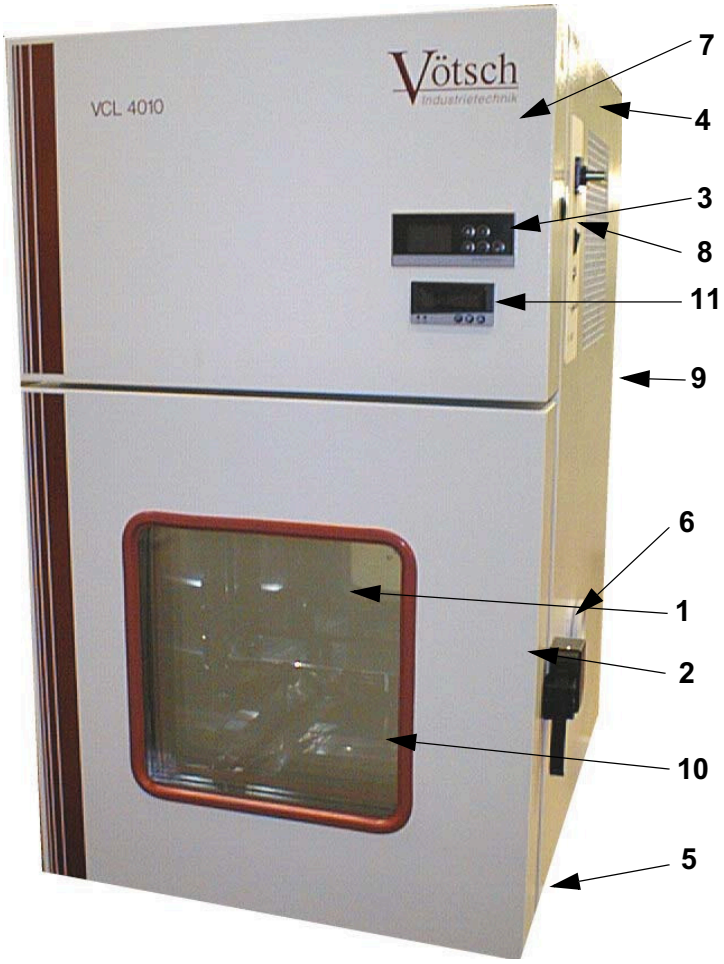


Fig 2-1
100-ltr test system

1 Test space
2 Test space door
3 Control unit »Mincontrol«
4 Mechanical section
5 Feet
6 Entry port
7 Electrical section
8 Main switch panel
9 Reservoir for demineralized water [2)]
10 Temperature and humidity sensors [2)]
11 Adjustable temperature limiter

1) option
2) climatic test systems only

2.2 Components and their function

→ *Fig 2-1 100-ltr test system (page 9)*

2.2.1 Test space

The test space is made of high-grade steel, material no. 1.4301. The test specimens can be placed on the insert shelf or the test space floor.

2.2.2 Test space door

The lock on the test space door can be secured with a key.

2.2.3 Control unit

All control and operating commands can be activated on the control unit by touching the respective function symbols.

2.2.4 Mechanical section

The mechanical section contains the equipment necessary for producing the test conditions. It is accessible by removing the panels. A special key is supplied for locking and unlocking.

2.2.5 Feet

Adjustable feet are provided to enable ventilation of the mechanical section and to compensate uneven floors.

2.2.6 Entry port

The entry port at the right side of the test system enables measuring lines and testing equipment to be introduced into the test space

- Observe the safety instructions → *»When using the entry ports« (page 6)*

2.2.7 Electrical section

The electrical section contains the system fuses, control modules and electrical components.

The controller design complies with EN 60204 Part 1.

1) option
2) climatic test systems only

2.2.8 Main switch panel

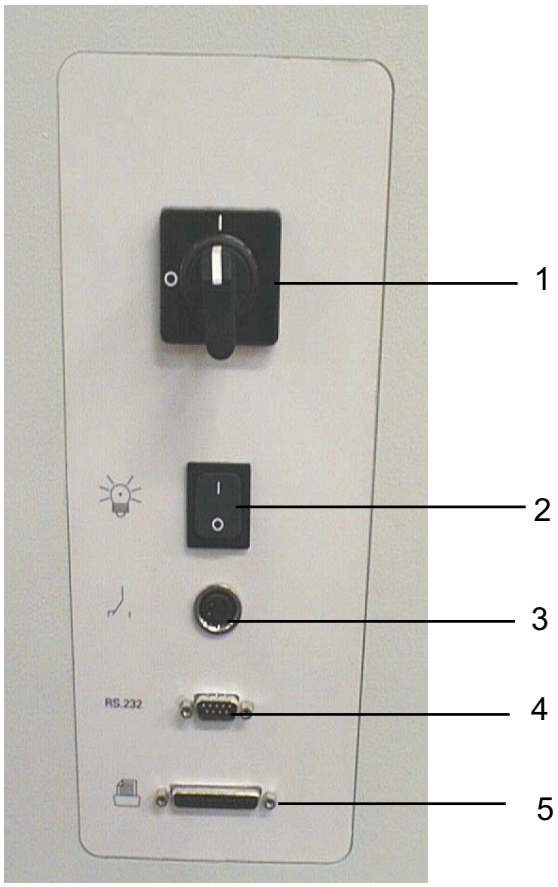


Fig 2-2
Main switch panel

The main switch panel contains the following connections:

1 Mains switch

2 Light switch

3 Potential-free contact → *Appendix : Interface connections*, *1.2 (page 1)*

4 Interface RS 232 → *Appendix : Interface connections*, *1.1 (page 1)*

5 Interface Centronics[1)]

WARNING
Connecting cables may only be plugged if the test system is switched off

GB VCL10EH032005
kap2.fm

1) option
2) climatic test systems only

2.2.9 Temperature and humidity sensors

The temperature and humidity sensors are located at the rear of the test space.

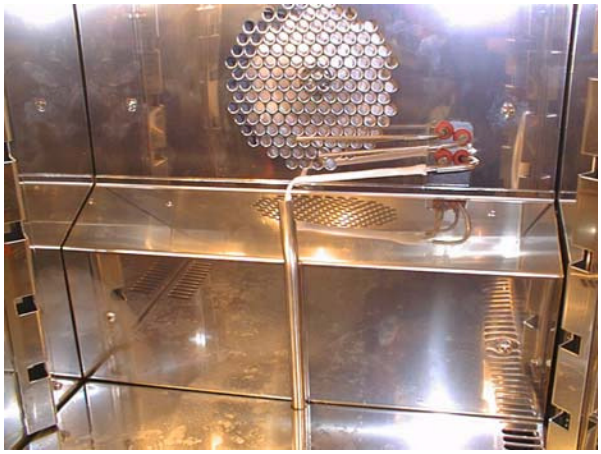


Fig 2-3
Sensor on 34-ltr and 64-ltr test systems

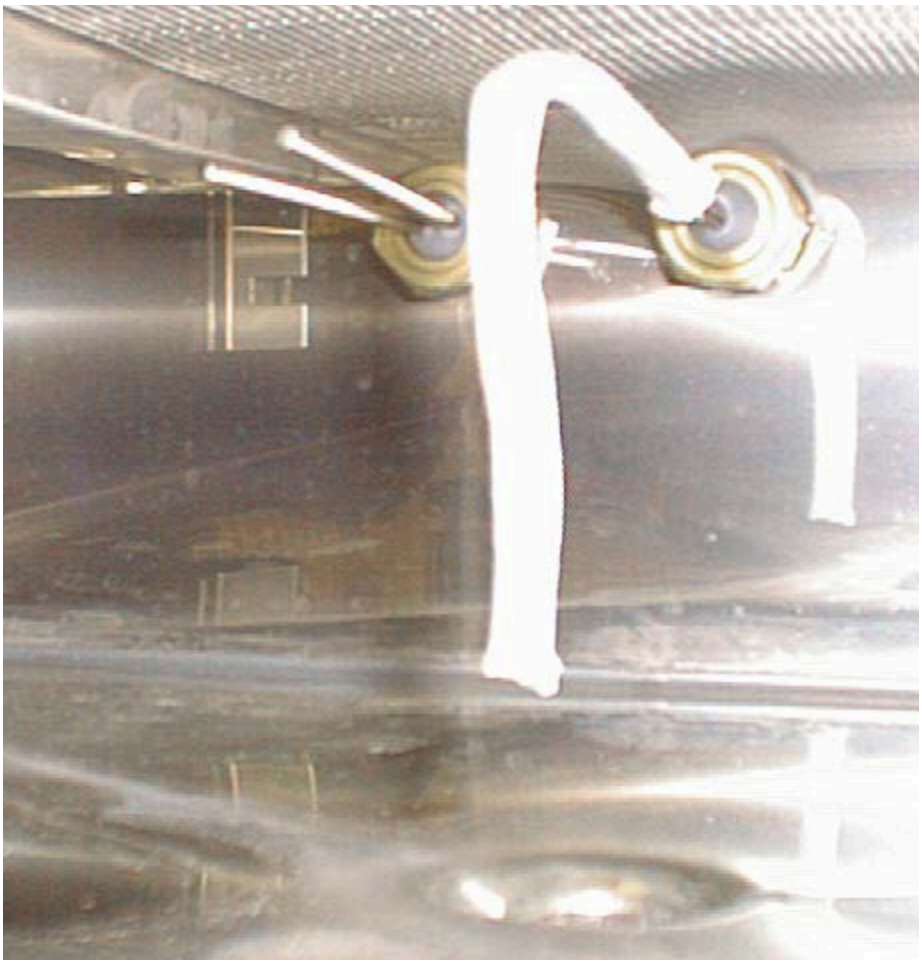


Fig 2-4
Sensor on 100-ltr test system

1) option
2) climatic test systems only

3 TECHNICAL DATA

These figures represent average values of standard test systems based on an ambient temperature of +25 °C. Rated voltage → *3.3 Operating data (page 14)*, without test specimen, without options.

NOTE
The dimensions are specified in the layout.

3.1 General characteristics

Temperature test system **Climatic test system**	**VCL 0003**	**VTL 4003** **VCL 4003**	**VTL 7003** **VCL 7003**
Test space volume	approx. 34 ltr	approx. 34 ltr	approx. 34 ltr
Weight	110 kg	110 kg	140 kg

Temperature test system **Climatic test system**	**VCL 0006**	**VTL 4006** **VCL 4006**	**VTL 7006** **VCL 7006**
Test space volume	approx. 64 ltr	approx. 64 ltr	approx. 64 ltr
Weight	120 kg	120 kg	150 kg

Temperature test system **Climatic test system**	**VCL 0010**	**VTL 4010** **VCL 4010**	**VTL 7010** **VCL 7010**
Test space volume	approx. 100 ltr	approx. 100 ltr	approx. 100 ltr
Weight	170 kg	190 kg	210 kg

3.2 Mechanical loads

Temperature test system **Climatic test system**	**VCL 00..**	**VTL 40..** **VCL 40..**	**VTL 70..** **VCL 70..**
Maximum load (evenly distributed over the entire surface)			
on test space floor	10 kg	10 kg	10 kg
on each insert shelf	10 kg	10 kg	10 kg
total shelf load	50 kg	50 kg	50 kg

GB VCL10EH032005
Kap3.fm

1) option
2) climatic test systems only

3.3 Operating data

Temperature test system **Climatic test system**	**VCL 0003**	**VTL 4003** **VCL 4003**	**VTL 7003** **VCL 7003**
Temperature test system **Climatic test system**	**VCL 0006**	**VTL 4006** **VCL 4006**	**VTL 7006** **VCL 7006**
Test space illumination	Halogen lamp 12V, 20W		
Emitted interference, interference immunity	see Declaration of Conformity		
Rated voltage	1/N / PE AC 230 V ± 10 % 50 Hz or 1/N / PE AC 254 V ± 10 % 60 Hz[1)]		
Rated power	1.8 kW	1.8 kW	2.7 kW
Rated current	8 A	8 A	11,7 A
On-site fuse protection	16A slow		
Protection class switchgear cabinet Protection class control unit	IP 22 IP 54		
Heat dissipation on air-cooled test systems			
max. heat dissipation to surroundings	800 W	800 W	1700 W

Temperature test system **Climatic test system**	**VCL 0010**	**VTL 4010** **VCL 4010**	**VTL 7010** **VCL 7010**
Test space illumination	Halogen lamp 12V, 20W		
Emitted interference, interference immunity	see Declaration of Conformity		
Rated voltage	1/N / PE AC 230 V ± 10 % 50 Hz oder 1/N / PE AC 254 V ± 10 % 60 Hz[1)]		
Rated power	2.7 kW	3 kW	3.5 kW
Rated current	11.7 A	13 A	15.2 A
On-site fuse protection	16A träge		
Protection class switchgear cabinet Protection class control unit	IP 22 IP 54		
Heat dissipation on air-cooled test systems			
max. heat dissipation to surroundings	1700 W	2000 W	2500 W

1) option
2) climatic test systems only

3.4 Noise measurement

In accordance with DIN 45635 (Part1 accuracy class 2)

Temperature test system **Climatic test system**	**VCL 00..**	**VTL 40..** **VCL 40..**	**VTL 70..** **VCL 70..**
Sound pressure level measured at a distance of 2 m from the front, 1 m in height, free-field measurement	approx. 56 dB(A)	approx. 56 dB(A)	approx. 59 dB(A)

3.5 Temperature tests

Temperature test system **Climatic test system**	**VCL 0003**	**VTL 4003** **VCL 4003**	**VTL 7003** **VCL 7003**
Temperature test system **Climatic test system**	**VCL 0006**	**VTL 4006** **VCL 4006**	**VTL 7006** **VCL 7006**
Temperature range	+10 °C to +180 °C	-40 °C to +180 °C	-70 °C to +180 °C
Temperature deviation in time in centre of working space	± 0.3 K to ± 1 K		
Temperature deviation in space	± 1 K to ± 2 K		
Temperature gradient (according to IEC 60068-3-5)	2 K to 4 K		
Rate of temperature change (to IEC 60068-3-5)			
Heating	1.5 K/min	2.5 K/min	2.5 K/min
Cooling	3 K/min	3.5 K/min	3 K/min
Heat compensation	-	max. 800 W	max. 550 W

Temperature test system **Climatic test system**	**VCL 0010**	**VTL 4010** **VCL 4010**	**VTL 7010** **VCL 7010**
Temperature range	+10 bis +180 °C	-40 bis +180 °C	-70 bis +180 °C
Temperature deviation in time in centre of working space	± 0.3 K to ± 1 K		
Temperature deviation in space	± 1 K to ± 2 K		
Temperature gradient (according to IEC 60068-3-5)	2 K to 4 K		
Rate of temperature change (to IEC 60068-3-5)			
Heating	1.5 K/min	2.5 K/min	2.5 K/min
Cooling	3 K/min	3.5 K/min	3 K/min
Heat compensation	-	max. 1100 W	max. 700 W

1) option
2) climatic test systems only

3.6 Climatic tests

• → *3.6.1 Humidity diagram (page 17)*

Humidity system	
contents of reservoir	approx. 13 ltr
water quality	demineralized
pH-value	6 – 7
conductivity	5 µS/cm - 20 µS/cm
water consumption at constant temperature of +40 °C, 92 %r.h.	approx. 2 ltr/ 24 /h
Temperature range	+10 °C to +95 °C
Humidity range	10 to 98 % r.h.
Temperature deviation in time in centre of working space	± 0.3 K to ± 0.5 K
Temperature deviation in space	± 0.5 K to ± 1.5
Temperature gradient (according to IEC 60068-3-5)	1 K to 3 K
Humidity deviation in time in centre of working space	± 3 to ± 5 % r.h.

1) option
2) climatic test systems only

3.6.1 Humidity diagram

The following humidity ranges may be used:

– range 1: standard range

– range 2: extended performance with compressed air dryer[1)] and capacitive humidity measuring system [1)]

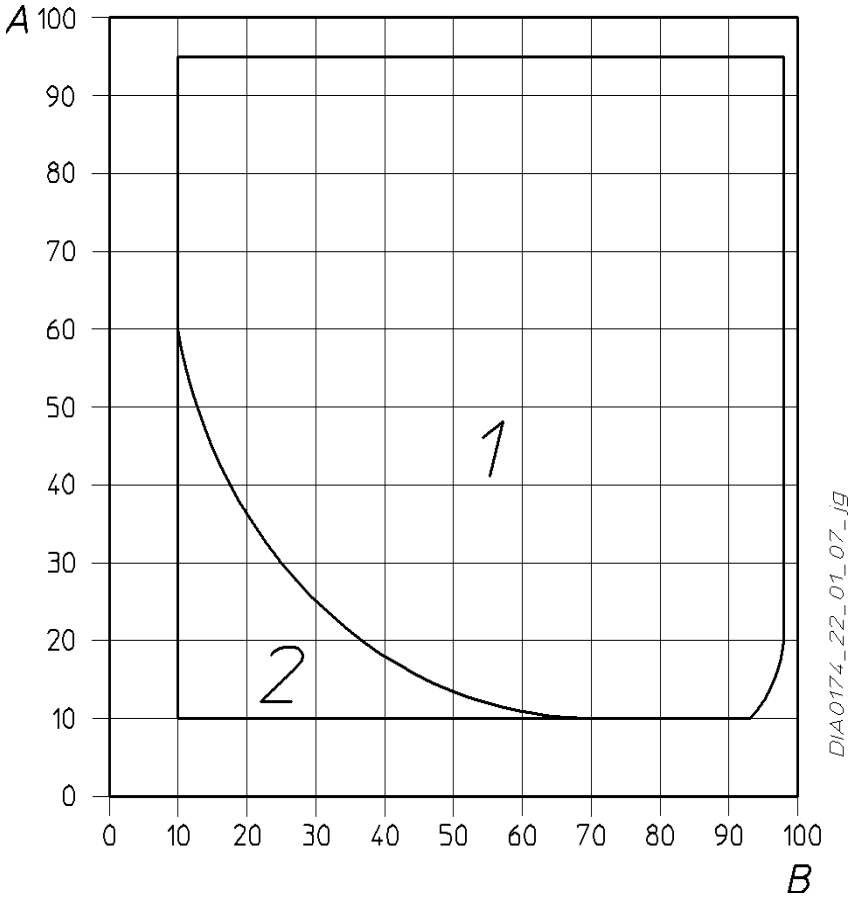


Fig 3-1
Humidity range

A Test space temperature in °C

B Relative humidity in %

1) option
2) climatic test systems only

1) option
2) climatic test systems only

4 PREPARATION FOR INITIAL OPERATION

4.1 Preparing the place of installation

4.1.1 Installation requirements

Ensure that the place of installation meets the following requirements:

- Rooms must be dry and ventilated
- A minimum volume of 2.5 m^3/kg of refrigerant is necessary.
  (For quantity of refrigerant → *Rating plate)*.
- If open flames or similarly hot surfaces are used on site, adequate ventilation must be provided due to potential leaks and decomposition products caused by refrigerants.
- Max. pollution degree 2 according to EN 50178
- Altitude max.1000 m above mean sea level
- Do not expose the test system to direct sunlight
- Avoid installing in the vicinity of heat sources
- Permissible ambient temperature during operation: +10 °C to +35 °C
- Permissible storage temperature: -25° C to +55 °C
- Relative atmospheric humidity: 75 % max.

DANGER

- Observe the directions → *1.5 (page 3)*

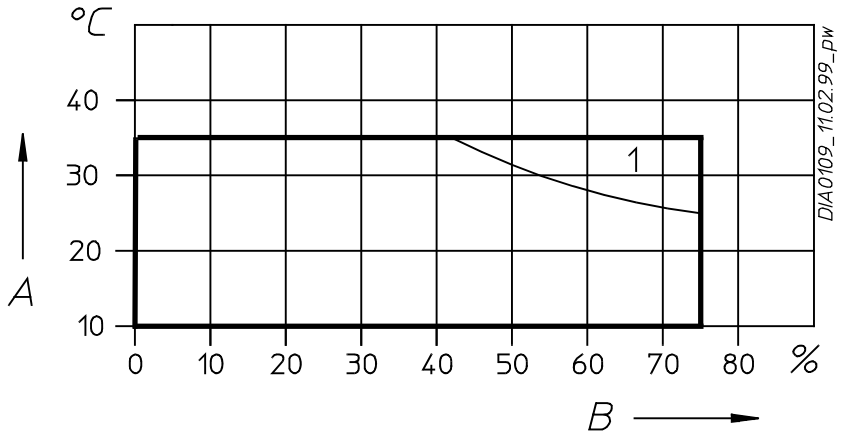


Fig 4-1
Installation requirements

A = ambient temperature in °C

B = relative humidity in %

NOTE

In case of low test space temperatures, environmental conditions according to range 1 may cause condensation on the surface of the test system.

1) option
2) climatic test systems only

4.1.2 Floor requirements

– The floor must be suitable for the weight of the test system and test specimens
→ *3.2 Mechanical loads (page 13)*

– The floor must be horizontal with an even surface. Slight unevenness can be compensated by adjusting the feet accordingly.

4.1.3 Space requirements

→ *Fig. 4-2 Layout 34-ltr test system (page 21)*

→ *Fig 4-3 Layout 64-ltr test system (page 22)*

→ *Fig 4-4 Layout 100-ltr test system (page 23)*

WARNING

Be sure to maintain the required distance from the wall.

1) option
2) climatic test systems only

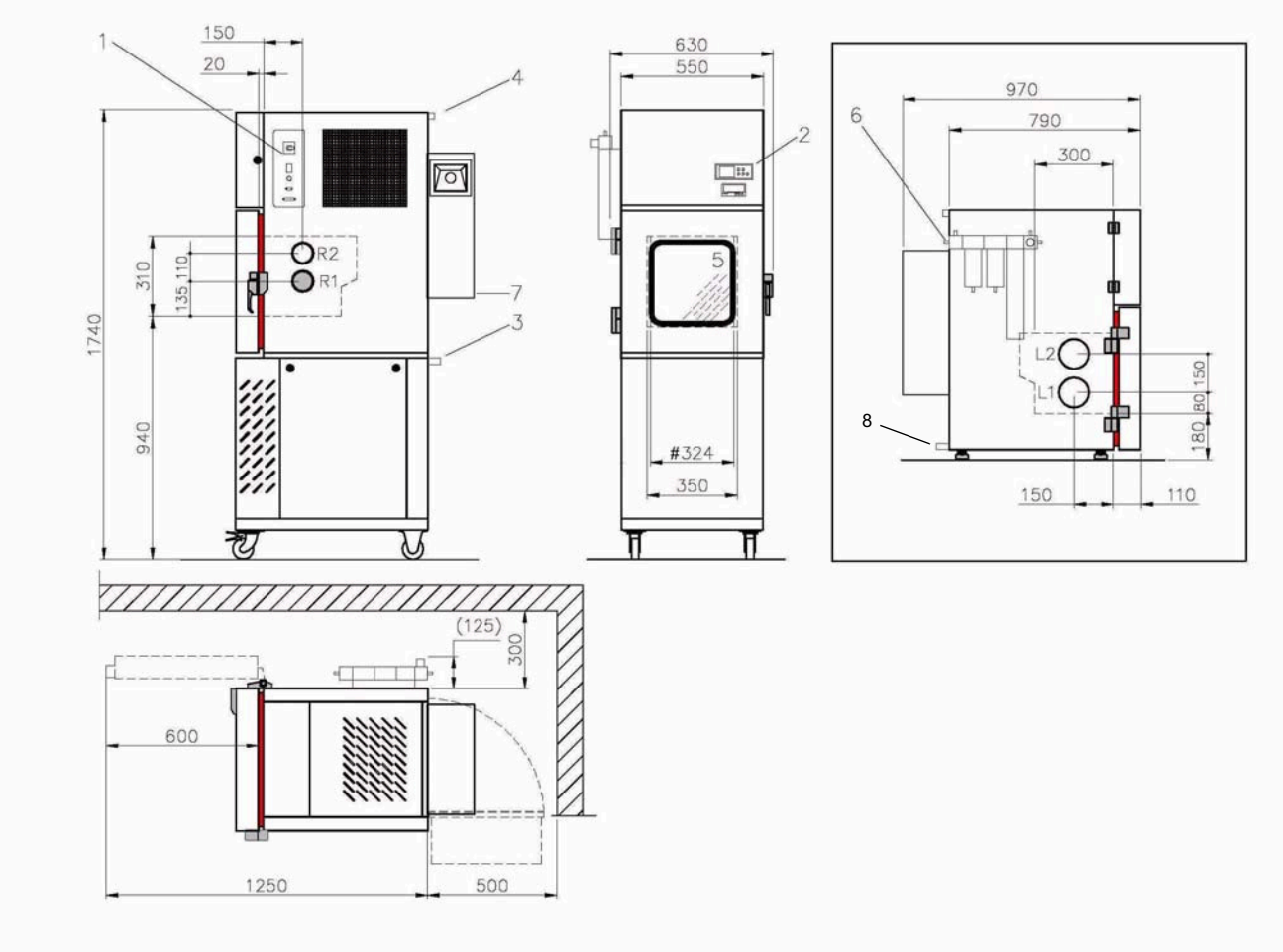


Fig. 4-2
Layout 34-ltr test system

R1: NW 50 mm - entry port installed in basic version
R2[1)], R3[1)] additional installation positions, right
L1[1)], L2[1)], L3[1)] additional installation positions, left

1 Main switch panel
2 Control unit
3 Condensate drain
4 Electrical connection, cable length approx. 3.5 m
5 Door with window
6 Connection for compressed air[1)]
7 Reservoir for humidification water [2)]
8 Connection for automatic water replenishment[1) 2)]
Useful width

1) option
2) climatic test systems only

Fig 4-3
Layout 64-ltr test system

R1: NW 50 mm - entry port installed in basic version
R2[1)], R3[1)] additional installation positions, right
L1[1)], L2[1)], L3[1)] additional installation positions, left

1 Main switch panel
2 Control unit
3 Condensate drain
4 Electrical connection, cable length approx. 3.5 m
5 Door with window
6 Connection for compressed air[1)]
7 Reservoir for humidification water [2)]
8 Connection for automatic water replenishment[1) 2)]
Useful width

1) option
2) climatic test systems only

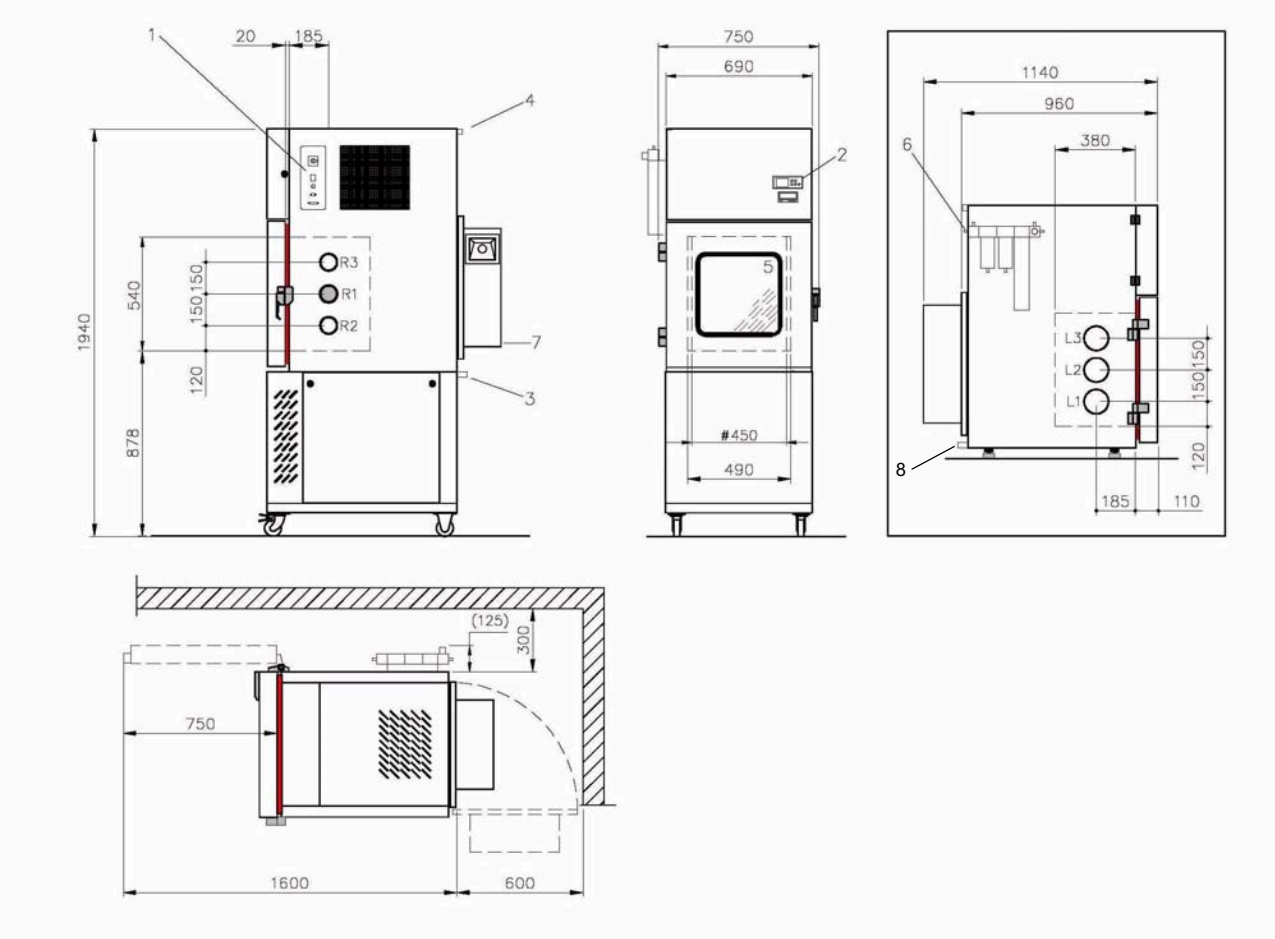


Fig 4-4
Layout 100-ltr test system

R1: NW 50 mm - entry port installed in basic version
R2[1)], R3[1)] additional installation positions, right
L1[1)], L2[1)], L3[1)] additional installation positions, left

1 Main switch panel
2 Control unit
3 Condensate drain
4 Electrical connection, cable length approx. 3.5 m
5 Door with window
6 Connection for compressed air[1)]
7 Reservoir for humidification water [2)]
8 Connection for automatic water replenishment[1) 2)]
Useful width

1) option
2) climatic test systems only

4.2 Transporting the test system

A fork stacker or other suitable lifting equipment with adjustable fork width is necessary for transporting the test system.

ATTENTION

- Do not apply straps

– You can lift the test system from the front or from behind, provided the fork length exceeds the depth of the test system as specified in the layout.

– You may lift the test system from the side if the fork is long enough to support the entire width of the test system.

NOTE

When detaching the transport pallet, lift the test system from the front or from the side.

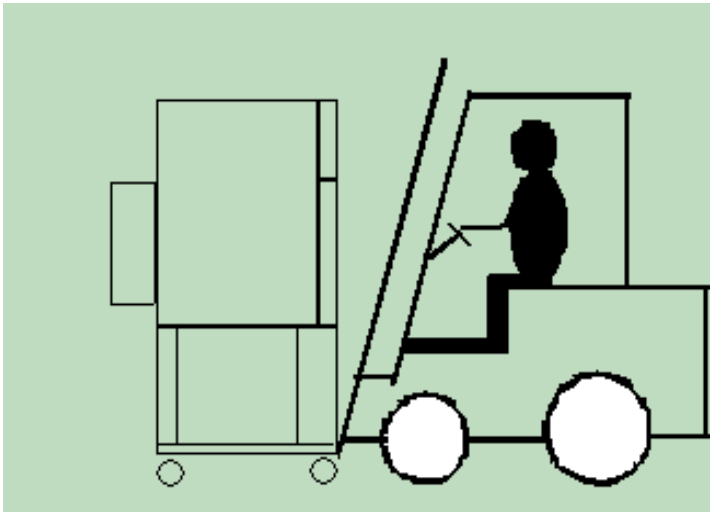


Fig 4-5
Fork lift

- Position the fork under the test system
- Adjust the fork width
- Raise the test system by approx. 50 mm
- Transport the test system to the place of installation
- The packing material must be disposed of according to regulations

1) option
2) climatic test systems only

4.3 Installing the test system

WARNING

The test system must be operated with mounted feet or castors to enable ventilation of the mechanical section.

4.3.1 Test systems with adjustable feet

- Use a spirit level to align the test system

NOTE

By raising the test system with a fork stacker the feet can be easily turned to facilitate horizontal aligning

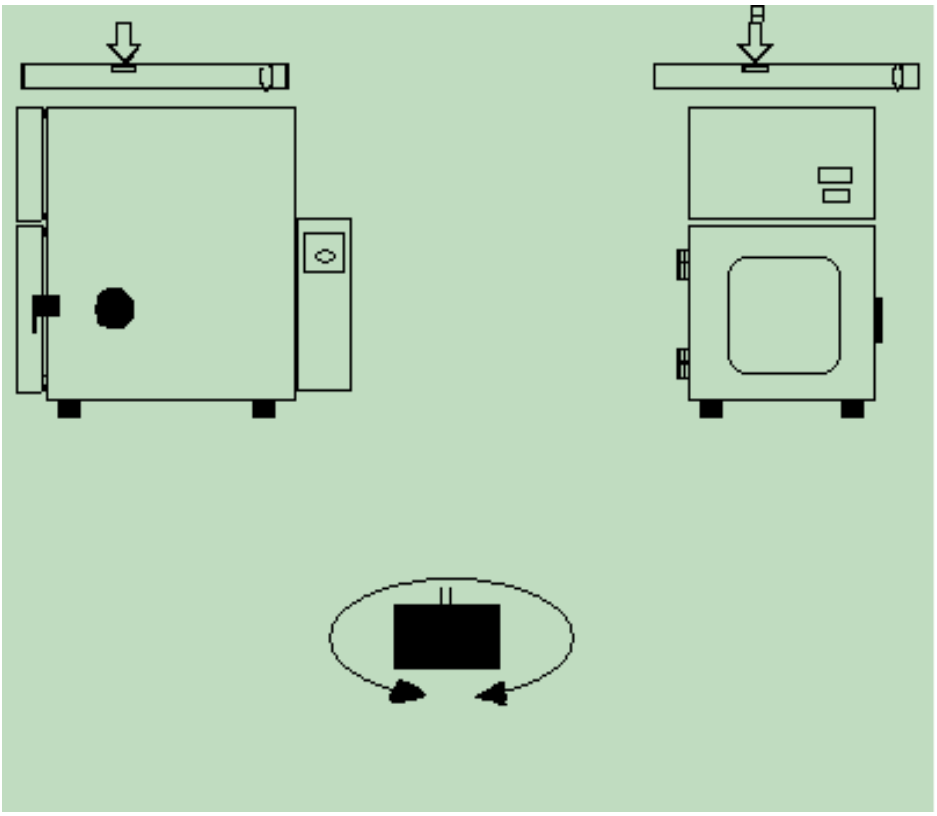


Fig 4-6
Aligning the test system

1) option
2) climatic test systems only

4.3.2 Mobile test systems[1)]

- Take the test system to the place of installation
- Apply the wheel brakes
- Turn the feet to compensate any floor unevenness and relieve the castors
- Use a spirit level for horizontal alignment

The test systems are supplied with two detached feet. Please fix them as follows:

- Take the feet out of the test space
- Raise the test system carefully with a fork stacker
- Insert one foot each in the threads provided at the rear right and left. Ensure the feet are securely mounted.

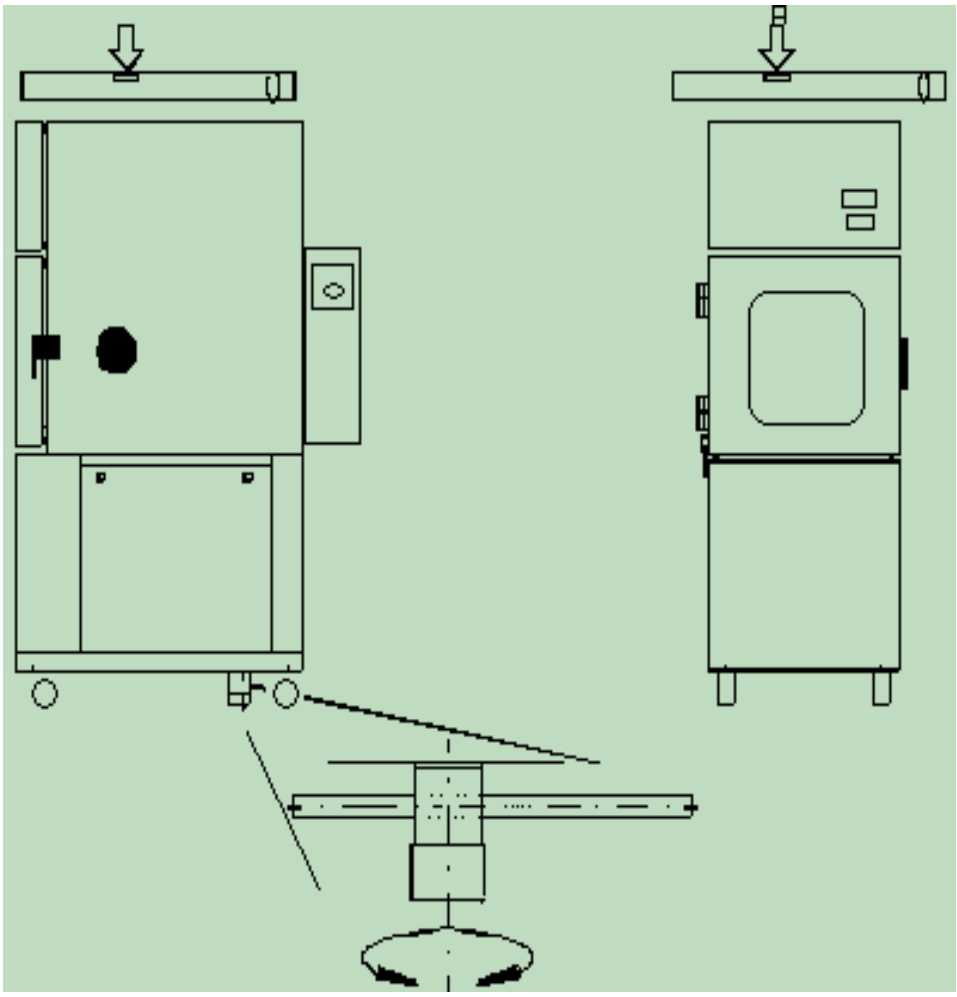


Fig 4-7
Adjusting mobile test systems

1) option
2) climatic test systems only

4.4 Connections

4.4.1 Location of connections

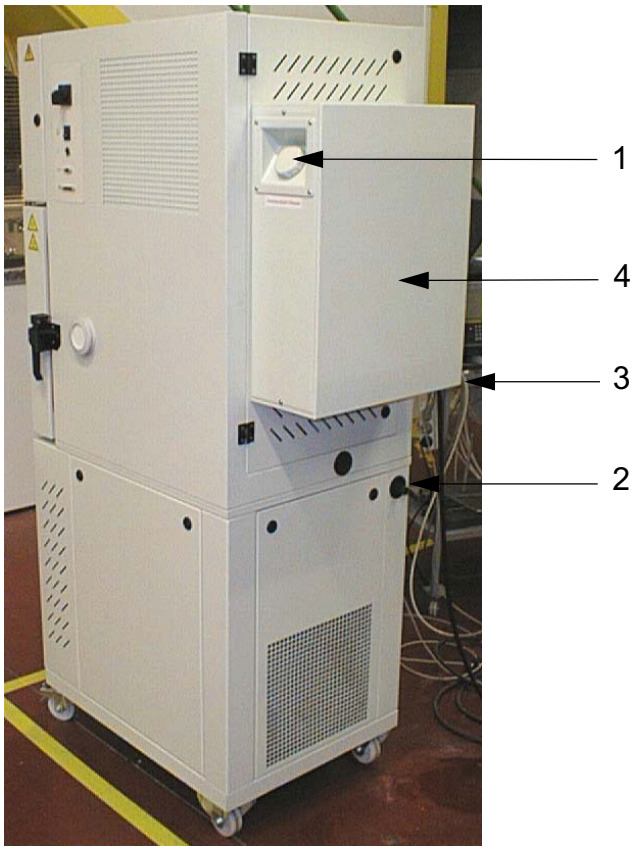


Fig 4-8
Connections on the reservoir

1 Filler cap for humidification water

2 Connection for overflow/condensate drain, Ø 16

3 Connection for automatic water replenishment[1)], external thread R ½“

4 Level indicator

1) option
2) climatic test systems only

4.4.2 Setting up the power supply

- Ensure that the mains voltage and frequency correspond to the specifications on the rating plate
- Ensure that the mains fuse is adequate
- Connect the test system to the mains supply

WARNING

If the on-site mains voltage and frequency differ from our standard values as per chap. → 3 Technical Data (page 13), the test system must be connected by a skilled person in accordance with the attached »Special voltage« manual.

4.5 Precommissioning check list

- Verify these preparatory steps:

– Does the place of installation meet the requirements? → *4.1.1 (page 19)*

– Does the wall distance comply with the specifications? → *Layout*

– Is the test system horizontal?

– Are the wheel brakes[1)] applied?

– Are the connections set up correctly?

– Are the hose connections secured with hose clamps?

– Does the humidification water comply with our specifications → *3.6 (page 16)*?

– Does the electrical supply comply with our specifications? → *3.3 (page 14)*

1) option
2) climatic test systems only

5 PUTTING INTO OPERATION

5.1 Adding humidification water 2)

You can fill the reservoir either by hand or connect it to a demineralized water network1).

5.1.1 Automatic water replenishment1) from a network

WARNING

If you are using demineralization cartridges with ion exchanger resins, please remember to replace exhausted cartridges (i.e. conductivity meter reads >20 µS/cm) without delay. Failure to do so may result in acidification of the humidification water, which has the potential of damaging the test specimens and the test system.

- Connect a pressure-proof hose to the connection (R ½“ external thread) at the rear of the test system
- Open the on-site water supply
- Watch the level indicator during the filling process

WARNING

The water level is controlled by a float valve. If the float valve becomes leaky, the water discharges via the overflow/condensate drain. Be sure to shut the on-site water supply at the end of operation.

1) option
2) climatic test systems only

5.1.2 Filling by hand

- Open the filler cap
- Fill the reservoir with demineralized water using e.g. a watering can

Fig 5-1
Water reservoir

NOTE
The reservoir holds approx. 13 ltr.
Standard water consumption is approx. 2 ltr/24 h.

The warning signal for water shortage occurs in two steps:

– When the reservoir is half empty, a warning signal indicates that the reservoir needs replenishing.

– Another warning signal, i.e »Reservoir humidity system empty« is emitted when the reservoir is empty. The climatic system is switched off. The test system continues with the set temperature values.

1) option
2) climatic test systems only

5.2 Preparing the humidity sensor 2)

If the test system is equipped with a psychrometric humidity measuring system, the humidity sensor is located below the air conditioning space.

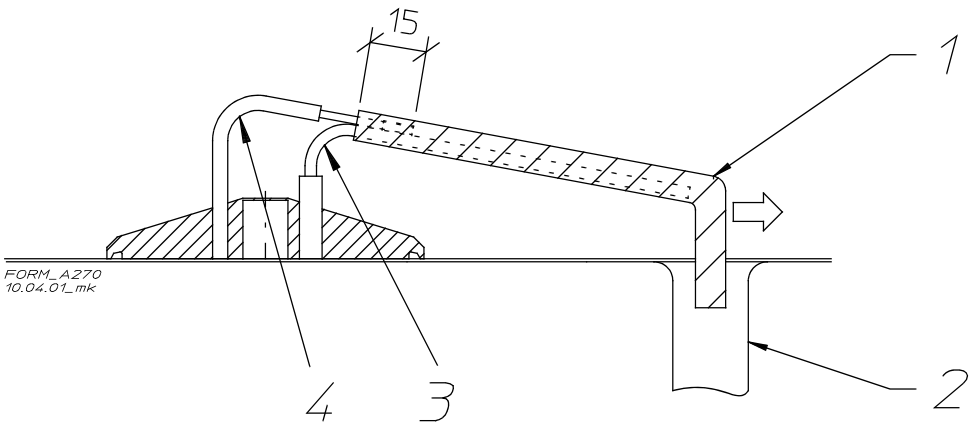


Fig 5-2
Humidity sensor

1 Humidification sleeve

2 Drain

3 Humidity sensor

4 Water feed tube

Before running tests with temperatures >+100 °C, the humidification sleeve must be removed. Afterwards it may be re-used. → *8.4.8 Replacing the humidification sleeve (page 49)*.

WARNING

Failure to remove the humidification sleeve can damage its tissue and cause measuring errors

1) option
2) climatic test systems only

5.3 Preparing the test specimens

5.3.1 Requirements

Test specimens can be placed on the test space floor or an insert shelf. They must be distributed evenly over the entire surface.

- Ensure that the test specimens are suitable with regard to
  - Quality → *1.5 (page 3)*
  - Corrosive effect → *1.5 (page 3)*
  - Weight → *3.2 (page 13)*
  - Heat influence → *1.6.5 (page 6)*

5.3.2 Corrosion caused by the test specimen

In conjunction with high temperature and humidity levels some test specimens will set harmful substances free which will corrode the chromium-nickel steels in the test space. Regular cleaning of the test space prevents such damage.

Corrosion is mainly caused by:

– Compounds of chlorines

– Acids

– Alkaline solutions

WARNING

Unwashed, mounted PCBs and some plastics set chlorides free. Please do talk to us about suitable precautions before using such test specimens.

5.3.3 Heat-emitting test specimens

Heat-emitting test specimens may be used. The permissible heat emission depends on the size of the test system as well as the test space temperature.

WARNING

The test system switches off automatically in case of faults thus disabling the cooling system. Heat-emitting test specimens would heat up the test space to inadmissible levels. It is therefore necessary to ensure that heat emission from the test specimen is disconnected when the test system is switched off.This may be triggered, for example, by the appropriately converted potential-free contact → Appendix : Interface connections, → 1.2 (page 1).

1) option
2) climatic test systems only

5.4 Adjusting the test specimen protection

5.4.1 Software temperature limiter

The controller has a software temperature limiter for setting alarm and warning limits for permissible minimum and maximum temperature values.

If no limits are set, the test system will automatically use the limit values of the previous test.

Set the limits in accordance with the separate operating manual for the control unit.

NOTE

On starting a test, ensure that the lower limit is below the actual test space temperature and the upper limit above the actual test space temperature. The permissible limits must be at least 5 K higher / lower than the respective setpoints of the test system. The exact upper and lower limits depend on the temperature sensitivity of the test specimen.

1) option
2) climatic test systems only

5.4.2 Test specimen protection by independent temperature limiter

A temperature limiter which operates independently of the controller protects the test specimen against thermal overstressing. A mobile temperature sensor can be conveniently positioned in the test space.

DANGER

The temperature sensor must not make contact with live parts

On exceeding or falling below the set maximum / minimum limits, the test system is switched off permanently by the controller. The control unit displays a fault message. Simultaneously, the respective indicator light (»MIN«/»MAX«) on the temperature limiter lights up.

The temperature limiter is located at the front of the test system, the respective measuring sensor »min./max. protect« in the test space.

WARNING

The limit for the maximum value must be 5 to 10 K above, the limit for the minimum value 5 to 10 K below the temperature setpoint.

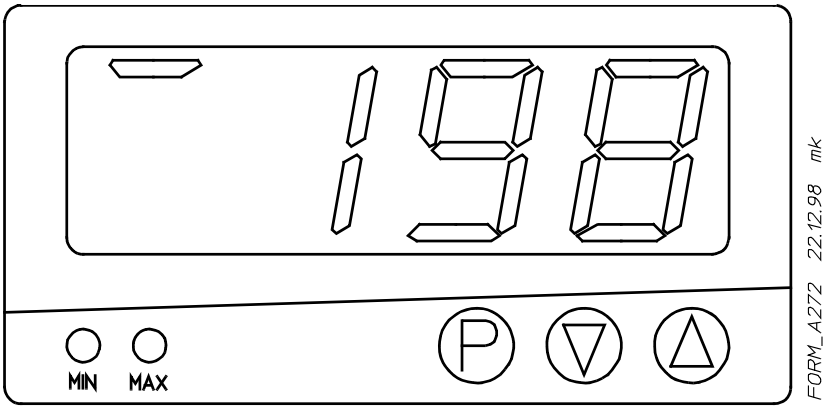


Fig 5-3
Temperature limiter

The limits are factory-set in accordance with the temperature range of the test system.

You can adapt these values to your requirements as follows:

1) option
2) climatic test systems only

Input the maximum temperature value as follows:

- Use Ⓟ to select display »AH«

Ⓟ + Δ >3s	»AH« (alarm limit high) and actual maximum temperature value are displayed alternately
Δ or ∇	Select the desired temperature value
2 x Ⓟ	Save the temperature value, return to basic setting.

Input the minimum temperature value as follows:

- Use Ⓟ to select display »AL«

Ⓟ + ∇ >3s	»AL« (alarm limit low) and actual minimum temperature value are displayed alternately
Δ or ∇	Select the desired temperature value
2 x Ⓟ	Save the temperature value, return to basic setting.

NOTE

Depress the combinations Ⓟ+Δ or Ⓟ+∇ simultaneously for more than 3 seconds while »AH« or »AL« is being displayed, otherwise the temperature value cannot be changed. In this case use Ⓟ again to select display »AH« or »AL«. If the changed temperature value is not saved with 2 x Ⓟ , the test system will return to the previously set temperature value after 30 seconds.

Malfunctions will cause the respective indicator light on the temperature limiter to light up. In addition, a fault message will be displayed on the control unit.

To eliminate the fault, proceed as follows:

- Increase the »AH« value or reduce the »AL« value by approx. 10 K. Alternatively, open the test space door until the temperature in the test space is back within the limit range.
- Save the new temperature value with 2 x Ⓟ
- Keep Ⓟ pressed for approx. 3 seconds, the indicator light goes off.
- Acknowledge the fault message on the control unit → *operating manual for the control unit*

If the test space temperature is still outside the limit range, the fault signal will occur again. By pressing Ⓟ, the actual value can be interrogated on the temperature limiter via function »INP«.

1) option
2) climatic test systems only

5.5 Sealing the entry ports

- Close the entry ports with the sealing plugs supplied

NOTE

Open entry ports will cause high water consumption during climatic tests [2]. As a result, tests with extreme humidity values are not feasible, and low test space temperatures may cause icing of the evaporator.

5.6 Switching on the test system

- Set the mains switch to »I«

5.7 Test space illumination

- Actuate the light switch on the main switch panel → *2.2.8 (page 11)*

NOTE

The light is switched off automatically by the controller after approx.10 minutes.

5.8 Starting a test

Tests are started on the control unit. For further details → *separate operating manual for the control unit*.

5.8.1 Temperature tests in manual mode

→ *separate operating manual for the control unit*.

5.8.2 Climatic [2] tests in manual mode

→ *separate operating manual for the control unit*.

1) option
2) climatic test systems only

5.9 Preoperational check list

- Verify these preparatory steps:

– Has humidification water [2] been added?
Has the automatic water replenishment[1) 2)] been set up? → *5.1 (page 29)*

– Has the humidity sensor [2] been prepared correctly? If scheduled temperatures exceed +100 °C, the humidification sleeve must be removed. → *5.2 (page 31)*

– Is the test specimen suitable for the planned test? → *5.3 (page 32)*

– Disconnection of heat-emitting test specimens must be ensured → *5.3.3 (page 32)*

– Check settings on software temperature limiter → *5.4.1 (page 33)*

– Check settings on adjustable temperature limiter → *5.4.2 (page 34)*

– Are the entry ports sealed? → *5.5 (page 36)*

– Maintenance work to be expected during the scheduled test period must be carried out beforehand → *8.3 (page 46)*

– Have all options been installed correctly?

1) option
2) climatic test systems only

1) option
2) climatic test systems only

6 PUTTING OUT OF OPERATION

The following directions must be observed:

6.1 After each test

- Set the test system to room temperature
- Finish the test
- Put external systems out of operation
- Put optional equipment out of operation

DANGER

The test space, the inside of the door, the air in the test space as well as the test specimen may still be hot or extremely cold.

- Wear safety gloves
- Open the test space door - be sure to avert your face from the test space air
- Remove the test specimen from the test space
- Clean and dry the test space.

1) option
2) climatic test systems only

6.2 Final disposal of the test system

In the event the test system is no longer needed, please ensure it is disposed of professionally.

DANGER

The following materials represent hazardous waste and must be disposed of separately:

– Refrigerants

– Compressor oil

– Electrical components

If desired, our service organisation can take care of the disposal, at customer's expense. Please get in touch with us so that we can arrange for a professional and environmentally acceptable way of disposal.

If you decide to dispose of the test system yourselves, please take the following precautions:

- Destroy the door lock
- Ensure that materials like refrigerants, compressor oil and electrical components are treated as special waste.

With regard to the specified materials and the disposal of the remaining components, the national and local waste disposal regulations, valid at the time of disposal, must be observed.

1) option
2) climatic test systems only

7 FAULT DIAGNOSIS AND RECTIFICATION

Depending on the kind of fault signal, the rectification can be performed by the user, a skilled person, or our service organisation.

7.1 General malfunctions

Fault	Possible cause	Rectification
Temperature and humidity set-points cannot be achieved	Lack of refrigerant in the refrigerating unit	Contact our service organisation
Actual humidity [2)] value deviates from setpoint	Humidifcation sleeve soiled.	Replace the humidification sleeve (this may be performed by the user)
	Humidification sleeve not wetted	Reactivate humidity. Check water feed to humidification sleeve. Failure means the pump is defective. Contact our service organisation.

1) option
2) climatic test systems only

7.2 Fault messages

Malfunctions which occur during operation are signalled by a flashing error message on the control unit and a red LED (the latter on control unit »Touchpanel« only).

If a fault occurs proceed as follows:

- Rectify the fault in accordance with the following table
- Acknowledge the error message → operating manual for the control unit
- Resume operation

Code No.	Message	Possible cause	Rectification
1	Act. value defect:EK0/X21	Temperature sensor defective	Switch off the test system. Contact our service organisation.
2	Act. value defect:EK1/X22	Humidity sensor defective	Switch off the test system. Contact our service organisation.
12	Change backup-battery	Controller battery exhausted	Switch off the test system. Contact our service organisation.
13	Communication control unit	Connection control unit - controller interrupted	Check connections
14	Communication I/O system	Connection controller - I/O system interrupted	Switch off the test system. Contact our service organisation.
15	Chambertype invalid	Wrong test system parameters	Switch off the test system Contact our service organisation.
16	Power fail	Power failure or tolerance band outside defined range	Check power failure and tolerance band values. Restart the test system.
19	Temp. limiter testchamber	Thermal safety device in the test space triggered	Switch off the test system. Contact our service organisation.
20	Thermal specimen protection	Limits of test specimen protection exceeded	Press „P“ or „RESET“ on the temperature limiter to clear the fault. Check limit setting and programmed setpoint. Switching point hysteresis is 2 K.
	Display of temperature limiter is flashing and reads 1999	Sensor of temperatur limiter is broken or short-circuited	Switch off the test system. Contact our service organisation.
21	Software specimen protection	Actual temperature value is outside the test chamber configuration	Check input and adjust setpoint to temperature range → *3 (page 13)*
22	Communication Datalogging	Connection SIMPATI interrupted	Check connections and cables
49	Humidity out of range	Actual humidity value is outside the test chamber configuration	Check input on the control unit. Adjust setpoint to permissible humidity range → *3 (page 13)*
50	Temp. limiter humidity system	Thermostat of water heater triggered	Open the mechanical section, press the reset button. Contact our service organisation.

1) option
2) climatic test systems only

Code No.	Message	Possible cause	Rectification
51	Humidity-calculator not OK	Water feed to psychrometer interrupted	Check position of humidification sleeve and pump water supply
52	Setpoint out of meas.-range	Dewpoint < -12 °C, but no capacitive humidity measuring system installed.	Select higher dewpoint
54	Refill demin. water!!!	Humidification water supply is used up	Replenish the water in the reservoir. The test system continues operating.
55	Reservoir humidity system empty	No water in humidity system or pump not working	Fill the reservoir. If the pump is defective, contact our service organisation.

Contact our service organisation if a fault cannot be rectified with the aforementioned measures, or if a fault occurs repeatedly.

NOTE

To ensure speedy service, please quote the following particulars when reporting a fault:

– Type of test system / order no.

– ID no.

– Fault message on the control unit

You will find this data on the rating plate on the left side of the test system and on the reverse of the front cover of this manual.

1) option
2) climatic test systems only

1) option
2) climatic test systems only

8 MAINTENANCE

8.1 General information

Regular care and maintenance are essential for optimum operation and long service life of the test system.

The maintenance schedule → *8.3 (page 46)* contains some basic maintenance work which may be performed on site, by trained personnel only. It does, however, not replace the expert maintenance offered by our service organisation.

The inspection intervals for refrigerating unit, electrical equipment and safety devices are specified in a maintenance contract with our service organisation.

NOTE

Annual inspection of the pressure limiter is necessary according to EN 378-2, Appendix C.6 Safety Requirements. The inspection must be performed by our service organisation, or a skilled person authorized by us.

DANGER

Maintenance work on refrigerating unit and electrical equipment must be performed by a skilled person.

- Contact our service organisation

We will either charge a qualified maintenance specialist to perform the servicing, or name you authorized experts.

Our service organisation has the technical facilities required for expert disposal of the waste material resulting from servicing. If desired, our service organisation will take back the material to be disposed of, at customer's expense.

1) option
2) climatic test systems only

8.2 Consumables

The following material is used for maintenance:

Ordering code	Designation
64444158	Humidification sleeve, length 10 m
60885666	Halogen bulb 12 V / 20 W
63640241	Cartridge for demineralization unit[1)]

- Consumables may be ordered from our service organisation

8.3 Maintenance schedule

Interval	Assembly group / component	Activity	Follow directions in chapter
After each test	Test space	Clean	→ *8.4.1 (page 47)*
	Test space seal	Clean	→ *8.4.2 (page 47)*
Monthly	Humidification water	replace	→ *8.4.6 (page 48)*
	Humidification sleeve	replace	→ *8.4.8 (page 49)*
Quarterly	Fins on air-cooled condenser	Clean	→ *8.4.4 (page 47)*
	Water reservoir	Clean	→ *8.4.7 (page 49)*
Yearly	Capacitive humidity system[1)]	Calibrate	→ *8.4.9 (page 49)*
As necessary	Halogen bulb	Replace	→ *8.4.5 (page 48)*
	Demineralization cartridge[1)]	Replace	→ see separate operating instructions

1) option
2) climatic test systems only

8.4 Maintenance work

- Observe the safety instructions → *1.6.5 (page 6)* »Maintenance work«

8.4.1 Cleaning the test space

To prevent corrosion, the inner walls must be cleaned with clear water and a regular detergent and subsequently dried.

DANGER

- Wear safety gloves
- Be careful not to damage the measuring sensors
- If corrosive deposits have formed, use a regular stainless steel cleanser. Be sure to remove all cleanser residue afterwards. If corrosive spots cannot be eliminated this way, polish with stainless steel cleaning wool.

8.4.2 Cleaning the test space seal

To prevent the test space seal from sticking to the test space door, or freezing up, it must be cleaned with clear water and subsequently dried after each test. You may use a regular detergent.

8.4.3 Checking the test space tightness

The test space must be sealed up tightly.
Check the tightness as follows:

- Place a paper strip between test space door and seal
- Pull it out - there must be a noticeable resistance
- Repeat this procedure all around the door

If the sealing is not tight, contact our service organisation.

8.4.4 Cleaning the air-cooled condenser

The air-cooled condenser is located in the mechanical section.

DANGER

The fins of the condenser may cause hand injuries

- Be sure to wear safety gloves

Dust deposits on the fins of the air-cooled condenser will cause non-permissible pressure increase in the refrigerating unit.

- Check the air-cooled condenser regularly for dust deposits.
  The condenser is accessible from the right side, except for -70 °C test systems where it is accessible from the rear.
- Clean the condenser every three months, more often in dusty environments.
- Use a vacuum cleaner, compressed air or a brush.

1) option
2) climatic test systems only

8.4.5 Replacing the halogen bulb

The light is located at the test space ceiling, on the left.

Fig 8-1
Test space illumination

- Unscrew the glass
- Remove the defective bulb
- Take the new bulb in a clean bloth and insert it
- Reassemble in reverse order

8.4.6 Replenishing the humidification water [2)]

Before starting a new test, check the water level in the reservoir. Top up via the feed opening, if necessary. No topping up is required if a demineralization unit[1)] or automatic water replenishment[1)] is installed.

WARNING

Only use distilled or demineralized water → 3.6 (page 16).
If the water is contaminated, the reservoir must be cleaned and filled with fresh water.

1) option
2) climatic test systems only

8.4.7 Cleaning the reservoir [2)]

WARNING

Be careful not to damage the float switches which are located in the rear section of the reservoir

Clean the reservoir as follows:

- Remove the panel opposite the screw cap
- Shut off the automatic water replenishment[1)]
- Open the screw cap
- Evacuate the reservoir
- Clean the reservoir carefully through the feed opening, using a brush.
- Rinse the reservoir
- Remove the rinsing water

8.4.8 Replacing the humidification sleeve

If the humidification sleeve of the humidity sensor → *Fig 2-3 (page 12)*, → *Fig 2-4 (page 12)* is soiled or damaged, it must be replaced.

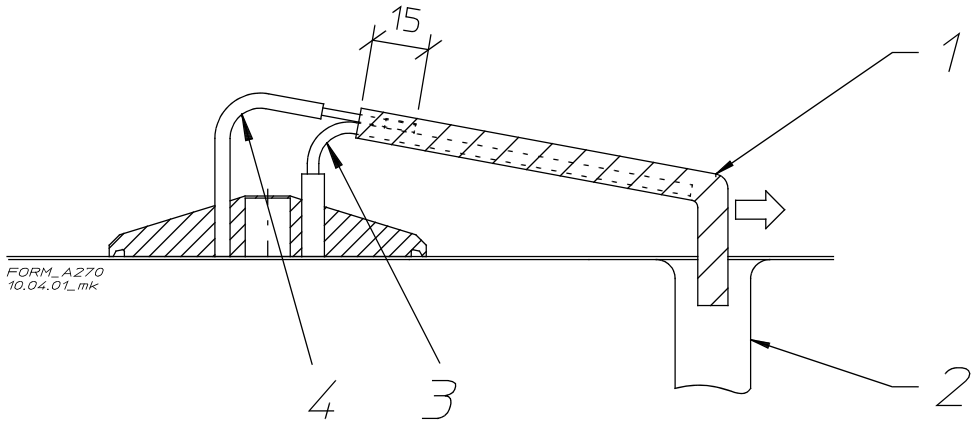


Fig 8-2
Humidity sensor

- Pull off the humidification sleeve (1) to the right
- Cut a length of approx. 100 mm from the new humidification sleeve
- Pull it over the humidity sensor (3) until it covers approx. 15 mm of the water feed tube (4)

8.4.9 Calibrating the capacitive humidity measuring system[1)]

As regard the humidity control with capacitive humidity measuring system[1)], please bear in mind that the displayed humidity values may differ from the actual ones, depending on the test conditions (high temperature and humidity values) and operating hours of the test system.

Gas emissions from the test specimens may affect the humidity measuring system thus causing deviations.

Yearly calibration of the humidity values by our service organisation is advisable.

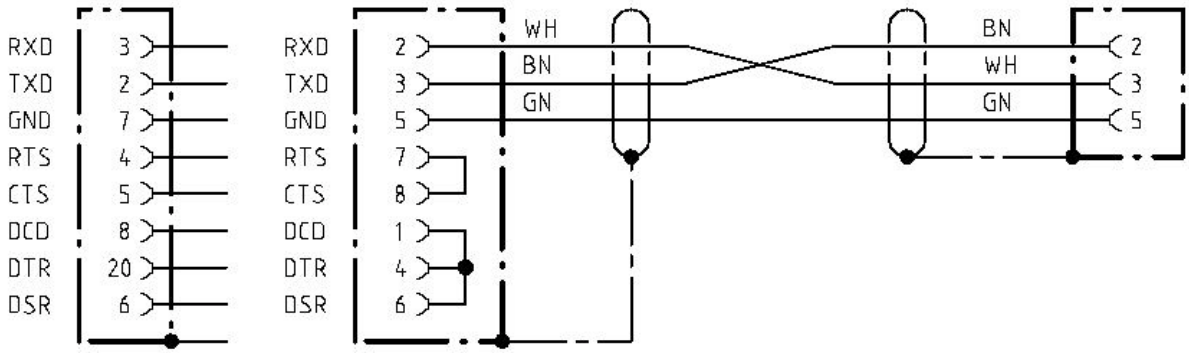
1) option
2) climatic test systems only

1) option
2) climatic test systems only

APPENDIX : INTERFACE CONNECTIONS

1.1 Interface RS 232

The RS 232 interface is used for e.g. external control via computer. Depending on the number of poles, the pin assignment is as follows:



PC
25-pole D-SUB / 9-pole D-SUB

Test system
9-pole D-SUB

Fig 1-1
Pin assignment RS 232

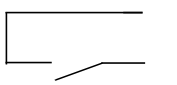
→ *2.2.8 (page 11)*

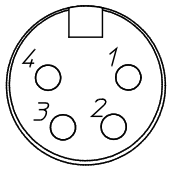
Suitable connecting cables and adaptors are available as options.

NOTE
If the connecting cable is produced by yourselves, be sure that both ends of the shield are fixed to the metallic enclosure.

1.2 Potential-free contact for disconnecting test specimens

The connection for the potential-free contact is taken to a socket (max. load 24 V, 0.5 A).





In case of malfunction pin 2 and 3 are open.

If the potential-free contact is used, ensure it is compatible with the on-site measuring system.

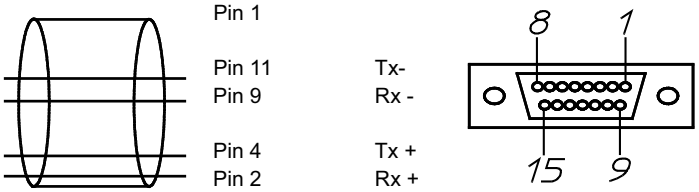
1) option
2) climatic test systems only

1.3 Interface RS 485 / RS 422[1)]

The network RS 485/RS 422[1)] interfaces in connection with Mini-Combox 2 are used for networking several test systems.

The 15-pole D-subminiature sockets are located on the connector panel → *Fig 1-2 (page 2)*

	PC		Test system	
Signal Gnd	Pin 1		Pin 1	
Rx -	Pin 11		Pin 11	Tx-
Tx -	Pin 9		Pin 9	Rx -
Rx +	Pin 4		Pin 4	Tx +
Tx +	Pin 2		Pin 2	Rx +



NOTE

The pin assignment for PC is only valid in connection with interface converter RS 232/RS 485, ordering code 63823080.
Interfaces RS 232 and RS 485/422[1)] cannot be used simultaneously.

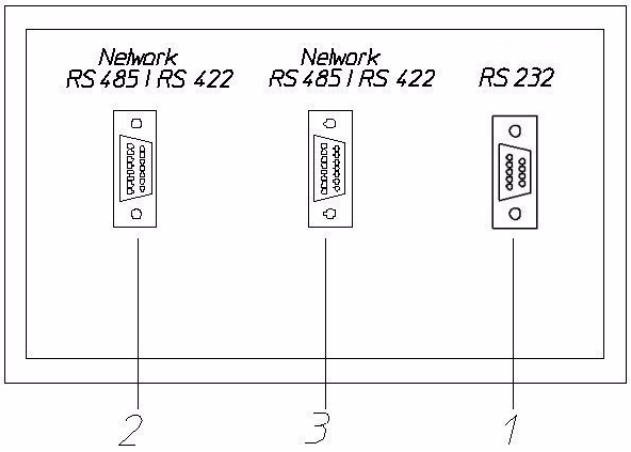


Fig 1-2
Connector panel

1 Interface RS 232

2 Interface RS 485 / RS 422[1)]

3 Interface RS 485 / RS 422[1)]

GB VCL10EH032005
A-schnit.fm

1) option
2) climatic test systems only

1.4 Ethernet interface[1)]

The interface enables communication with the Simpati software[1)] (from version 2.04 up) in LAN (Ethernet LAN). The communication occurs via TCP/IP. A separate IP address must be assigned to each test system.

NOTE
We would advise you to have the networking done by your network administrator. Attached please find the necessary software. The description in the appendix in the installation and operating instructions for the Simpati software must be observed.

The connector socket »RJ 45« is located on the outside of the test system. It is marked as follows:

1.4.1 Technical Data

For setting up the connection, a network cable type patch cable RJ45, Cat.5, STP, 4 x 2 is required.

NOTE
Owing to the installation of the TCP/IP interface, interface RS 232 is no longer available. The Ethernet and RS 485/422[1)] interfaces cannot be used simultaneously.

1.4.2 Installation

- Select interface protocol »J-Bus TCP/IP« on the control unit → *separate operating manual for the control unit*

The programming can be done at the factory provided the user-specific data are available.

If the programming is done by yourselves, please note the instructions on the CD attached.

1) option
2) climatic test systems only

1) option
2) climatic test systems only

APPENDIX : COMPRESSED-AIR DRYER AND CONNECTION FOR COMPRESSED AIR[1)]

This appendix contains operating instructions for condensation protection and dew-point extension by dried compressed air.

1.1 Description

1.1.1 Design

For location of the compressed air connection → *Layout*.

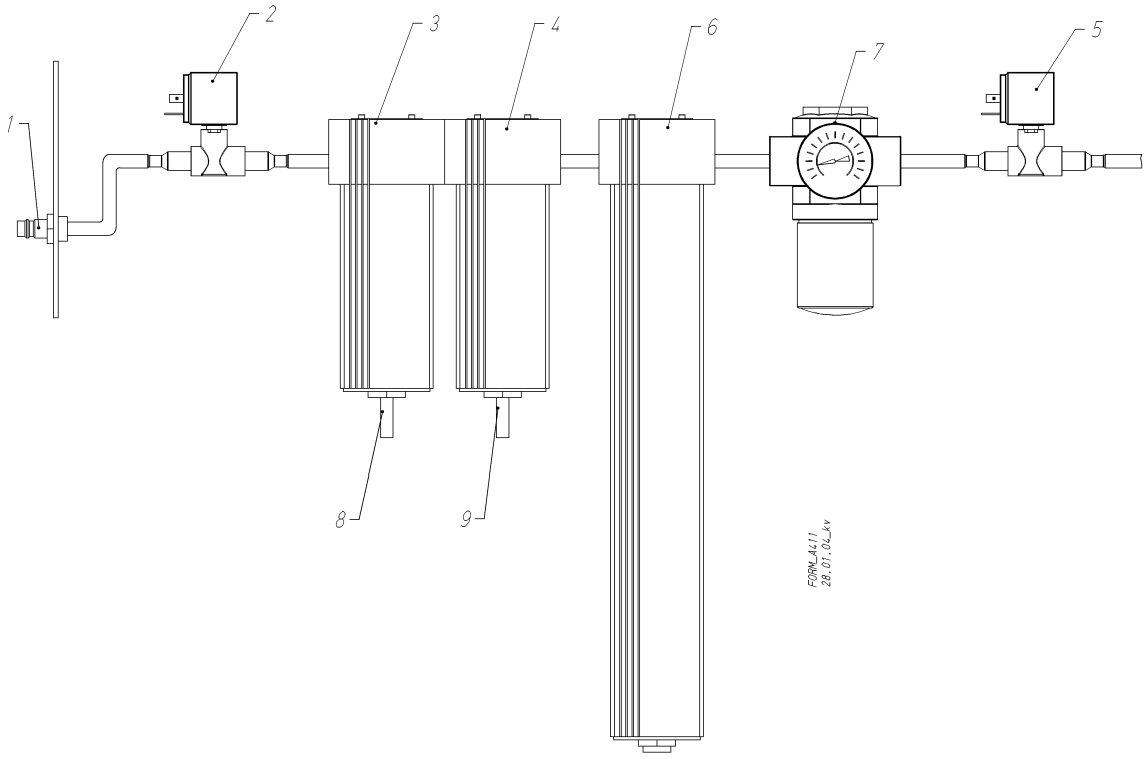


Fig. 1-1
Compressed-air dryer

1 Coupling for on-site compressed air
2 Solenoid valve
3 Fine filter
4 Super fine filter
5 Solenoid valve [2)]
6 Compressed-air dryer
7 Pressure reducer with pressure gauge
8 Condensate drain, fine filter (oil/water mixture)
9 Condensate drain, super fine filter (oil/water mixture)

1) option
2) climatic test systems only

1.2 Function

The test system has a connection[1)] which can be used either for on-site dried compressed air, or compressed air for the dryer. If the compressed-air dryer[1)] is installed, the compressed air passes through a fine filter and a super fine filter → *Fig. 1-1 (page 1)* before entering the compressed-air dryer for dehumification.

The flow rate of dried compressed air can be adjusted to the volume of the test space on the pressure reducer. Via a solenoid valve the dried air is then fed to the test space where it mixes with the existing air. These two air quantities determine the moisture content of the resultant mixture in the test space.

Depending on the dew-point range, the air humidity can be regulated within defined temperature limits, or the dried air is continuously added for condensation protection.

NOTE

If on-site dried compressed air is used, please remember that the obtainable dew points depend on the quality of the compressed air.

1.2.1 Unregulated dew points up to -30 °C

During temperature tests, dew points up to -30 °C can be obtained with temperature and climatic test systems. Dried compressed air is continuously fed to the test space. Dehumidification can be performed via digital channel »Compressed air/GN2« up to +70 °C.

1.2.2 Dehumidification during the heating phase

Applicable to temperature tests with temperature and climatic test systems.
Dried compressed air is continuously fed to the test space thus preventing condensation on the test specimen.
Condensation protection can be activated via digital channel »Condensation protection«.
Dehumidification is switched off as soon as cooling sets in.
On reaching the setpoint, it is switched off with a time delay of approx. 5 minutes.

1.2.3 Regulated dew points up to -20 °C [2)] with capacitive humidity sensor[1)]

Applicable to humidity tests with climatic test systems.
The set dew points are regulated by the solenoid valve in connection with the capacitive humidity sensor. For permissible temperature and humidity setpoints → *3.6.1 Humidity diagram (page 17)*

1) option
2) climatic test systems only

1.3 Technical data

Permissible working pressure	4 to 12 bar g
Temperature range for compressed air	+2 °C to +60 °C
Compressed-air connection	Self-locking coupling, DN 7.2

NOTE

The compressed air must be free from corrosive water, oil or solid particles. Poor quality can cause condensate which discharges via drain (8) and (9) → Fig. 1-1 (page 1). The discharged condensate (oil/water mixture) must be collected on site.

1.4 Preparation for initial operation

- Attach the coupling to the on-site compressed-air hose (inside diameter 6 mm)
- Insert the coupling in connection »Compressed air/GN2«

1.5 Putting into operation

1.5.1 Unregulated dew points up to -30 °C

Activate dehumidification as follows:

- Make sure the compressed air supply is in order
- Input the temperature setpoint on the control unit
- Activate digital channel »Compressed air/GN2« → *Operating manual for the control unit*
- Start the test

1.5.2 Dehumidification during the heating phase

Activate dehumidification during the heating phase as follows:

- Make sure the compressed air supply is in order
- Input the temperature setpoint on the control unit
- Activate digital channel »Condensation protection« → *Operating manual for the control unit*
- Start the test

NOTE

To enhance the effectiveness of this function, it is advisable to activate digital channel »Condensation protection« already during the cooling phase.

1) option
2) climatic test systems only

1.5.3 Regulated dew points up to -20 °C

Activate the dew point regulation as follows:

- Make sure the compressed air supply is in order
- Input the temperature setpoint on the control unit
- Input the humidity setpoint on the control unit
- Activate digital channels »Humidity«, »Capacitive sensor« and »Compressed air/ GN2« → *Operating manual for the control unit*
- Start the test

NOTE

Ensure that the temperature and humidity setpoints comply with the humidity diagram in the operating instructions.

1.6 Putting out of operation

- Deactivate digital channel »Compressed air/GN2« and »Condensation protection«

1.7 Fault diagnosis and rectification

Fault	Possible cause	Rectification
Dew point too high	Working pressure too low	Increase the working pressure. If dried compressed air from a local source is used, check its quality.
Dryer fails to operate	Digital channel not activated	Activate digital channel on the control unit
	Compressed-air supply fails	Check pressure on the pressure reducer. Ensure the compressed air supply is working.

1) option
2) climatic test systems only

1.8 Maintenance

- Observe the directions → *1.6.5 (page 6)* »Maintenance work«

1.8.1 Monthly Maintenance

- Check if condensate (oil/water mixture) discharges from the filter elements → *1.3 (page 3)*

1.8.2 Maintenance after 4000 operating hours or at least once a year

Replace the filter element of fine filter and super fine filter as follows:

→ *Fig 1-2 Replacing the filter element (page 6))*

- Detach the compressed air hose (unpressurized)
- Undo screw (2) of slide (1)
- Push slide (1) downward
- Unscrew the filter housing (3)
- Pull the filter element (4) out of the filter top (5)
- Replace fine filter »04F« and super fine filter »04S«.
  For type designation see bottom of filter element and filter housing.

WARNING

Take care not to mix up the filter elements

- Attach sticker with date of next filter exchange to the test system.
  Ensure it is easily visible.
- Reassemble in reverse order

1) option
2) climatic test systems only

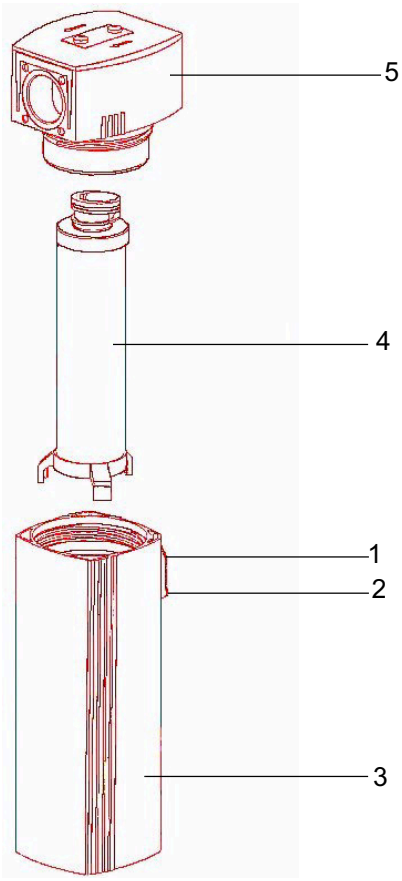


Fig 1-2
Replacing the filter element

WARNING
Failure to change the filter elements will destroy the diaphragm in the compressed-air dryer and render the dryer ineffective.

1.8.3 Consumables

Ordering code	Designation
62836003	Filter element »04F« and »04S«

Consumables may be ordered from our service organisation. For the address → *Appendix*.

1) option
2) climatic test systems only

APPENDIX : DEMINERALIZATION UNIT[1)] TYPE B10DN

This appendix contains installation and operating instructions for the demineralization unit.

1.1 Description

1.1.1 Design

Choose a convenient place near the test system. Use flexible hoses to connect the unit to the on-site water supply and test system.

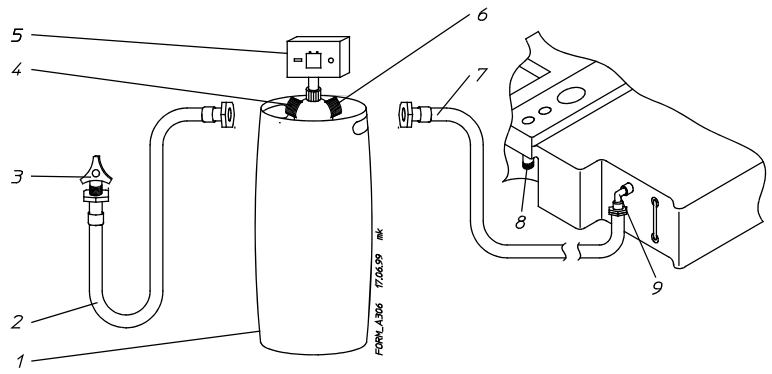


Fig. 1-1
Demineralization unit

1 Cartridge
2 Water inlet hose R ¾“
3 On-site water tap
4 Inlet connection
5 Conductivity meter
6 Outlet connection
7 Water outlet hose R ¾“
8 Connection overflow reservoir
9 Connection reservoir

1.1.2 Function

The demineralization unit ensures a reliable supply of demineralized water for the humidification system.

Filling by hand is no longer necessary.

1) option
2) climatic test systems only

1.2 Technical data

→ *Fig. 1-1 Demineralization unit (page 1)*

1.2.1 Dimensions

Diameter	210 [mm]
Height incl. conductivity meter (5)	680 [mm]
Height cartridge only (1)	550 [mm]

1.2.2 Connection data

Max. allowable working pressure	10 bar
Inlet (4)	R ¾ “
Outlet (6)	R ¾ “

1.2.3 Performance data

Output based on water hardness: 10° dH (approx. 100 mg CaO/ltr) 20° dH (approx. 200 mg CaO/ltr)	 1200 ltr 600 ltr
Maximum flow	300 ltr/h
Exhaustion point	20 µS/cm

1.2.4 Power supply

Rated voltage	230 V AC / 50 - 60 Hz
Rated current	5 mA
Protection	IP 65

1) option
2) climatic test systems only

1.3 Preparation for initial operation

1.3.1 Setting up the connections

Connect the supply hoses as follows:

→ *Fig. 1-1 Demineralization unit (page 1)*

- Fix the straight screw connection of the water inlet hose (2) to the on-site tap (3), size R ¾“
- Fix the elbow screw connection of the water inlet hose (2) to the inlet connection (4) of the demineralization cartridge (1)
- Fix the elbow screw connection of the water outlet hose (7) to the outlet connection (6) of the demineralization cartridge
- Open the front flap beneath the test space door
- Pass the hose under the test system and fix the straight screw connection to connection piece (9) »Demineralized water« on the reservoir
- Screw the conductivity meter (5) to the top of the demineralization cartridge
- Connect the overflow (8) of the reservoir to a floor outlet

WARNING

For safe operation it is essential to:

– Insert the seals supplied in the hose connections

– Ensure a water pressure between 1.5 to 6 bar

WARNING

Connect the demineralization unit to a cold water tap only

- Protect the unit against freezing and heat

NOTE

The local plumbing regulations and water board instructions must be observed

- Keep the cartridge caps and apply them when returning the cartridges for regeneration

1.3.2 Electrical connection

- Insert the mains plug of the conductivity meter in an on-site socket-outlet

1) option
2) climatic test systems only

1.4 Putting into operation

WARNING

Prior to switching on, be sure to:

– Put the test system into operation in accordance with → *5 (page 29)*

– Close the test space door

Longer rest periods and a weak flow will cause reionization thus increasing the conductivity value. If this happens, drain water until the conductivity value drops below 20 µS/cm.

If the value fails to drop below 20 µS/cm → *1.7 Maintenance (page 5)*

1.4.1 Venting the cartridge

WARNING

Ensure that every new or newly regenerated cartridge is thoroughly vented

- Fix the water inlet hose to the outlet connection (on pressure-proof cartridges pull back the red ring of the quick-release coupling)
- Open the water tap until water comes out of the inlet connection
- Set up the connection again in accordance with → *1.3.1 (page 3)*
- Open the water tap
- Drain water until the pointer of the conductivity meter is back in the green zone

1.5 Putting out of operation

Depending on the duration of the rest period, the following steps must be taken:

- Turn off the on-site water supply
- Undo the hose screw connections
- Allow the water to drain off

GB VCL10EH032005
A-entsal.fm

1) option
2) climatic test systems only

1.6 Malfunctions

1.6.1 Fault diagnosis and rectification

Fault	Possible cause	Rectification
Conductivity value exceeds 20 μS/cm	The resin in the cartridge is exhausted	Replace the cartridge → *1.7.1 (page 5)*
	Reionization caused by long rest periods or weak flow	Drain water until conductivity value drops below 20 μS/cm

1.7 Maintenance

- Observe the directions → *1.6.5 (page 6)* »Maintenance work«
- Pull the mains plug of the conductivity meter

1.7.1 Changing the cartridge

On reaching a conductivity limit of 20 μS/cm during operation, the cartridge must be replaced.

NOTE
It is advisable to keep a spare cartridge ready from the time when the conductivity meter reads 10 μS/cm

To change the cartridge proceed as follows:

- Turn off the on-site water supply
- Undo the screw connections on the cartridge
- Pull the mains plug of the conductivity meter
- Detach the conductivity meter from the cartridge
- Drain off the residual water in the cartridge
- Send exhausted cartridges to one of the behropur stations for regeneration
- Connect a new cartridge → *1.3.1 (page 3)*

WARNING
There is still some water left in the hoses

1) option
2) climatic test systems only

1.7.2 Consumables

The following material is used for maintenance:

Ordering code	Designation
63640241	Cartridge for demineralization unit[1)]

Consumables may be ordered from our service organisation.
For the address → *Appendix*

1.7.3 behropur station Germany

BEHR
Labor - Technik
Spangerstraße 8

40599 Düsseldorf

Tel.: (0211) 7 48 47 - 0

Fax: (0211) 7 48 97 72

1) option
2) climatic test systems only

APPENDIX : WATER-COOLED CONDENSER[1)]

Deviating from the standard design, this test system has a water-cooled condenser. Consequently, the particulars referring to the air-cooled version in the operating manual are not applicable.

For technical data please refer to the attached layout.

Heat dissipation to surroundings is reduced to approx. 0.5 kW.

1.1 Cooling water

Water pressure required	2.5 to 6 bar
Differential pressure in the cooling water circuit	≥ 2 bar
Inlet temperature	12 °C to 28 °C
pH-value	7.5 to 9
Quality	without impurities, preferably colourless and clear (max. size of impurities 100 µm)
Total hardness	max. 8°dH (approx. 80 mg CaO/ltr)
Conductivity	< 500 µS/cm (reference temperature + 20 °C)
Chloride	< 10 g/m^3
Sulfate	< 100 g/m^3
Hydrogen carbonate	< 300 g/m^3
Sulfate-hydrogen carbonate ratio	< 1
Nitrate	< 100 g/m^3
Dissolved iron	< 0.2 g/m^3
Free corrosive carbonic acid	< 20 g/m^3
Consumption at full load cooling water temperature +18 °C, Δt =10 K cooling water temperature +28 °C, Δt = 5 K	 0.5 m^3/h 1 m^3/h

WARNING

Before using fountain or pond water you must have a water analysis performed and consult our service organisation.You can ascertain the relevant data on water quality yourselves or contact your local waterworks.

GB VCL10EH032005
A-Wasserkühlung.fm

1) option
2) climatic test systems only

1.2 Connecting the cooling water

Connect the cooling water inlet and outlet to the on-site cooling water network.

For details on connections → attached layout.

The connections are located on the left side of the test system.

WARNING

Be sure to use temperature and pressure-proof connecting lines

WARNING

It is advisable to install a water stop or sensor device in the cooling-water supply line, as a protection against damage by water. Such safety devices are available at your stockist.

NOTE

Ensure that the water in the cooling tower circuit is kept free from microorganisms (algae). This can best be achieved by adding a disinfectant to the water.

WARNING

In case of cooling water circuits with on-site shutoff valves, please bear in mind that running the refrigerating unit with closed shutoff valves causes non-permissible pressure. For safety reasons, a pressure relief valve which opens at 10 bar g must be installed in the shutoff section.

1) option
2) climatic test systems only

1.3 Putting out of operation

If a longer rest period is expected, the following activities - in addition to those in chapter → *6.1 (page 43)* and → *6.2 (page 43)* - must be performed:

WARNING

If there is danger of frost, the cooling water circuit must be emptied to prevent damage to the components.

- Detach the on-site cooling water inlet and outlet from the test system
- Place a vessel for residual cooling water under connection »Cooling water outlet«
- Insert a screwdriver in the lateral slot of the cooling water flow regulator
- Push the screwdriver downward
- Introduce compressed air into the cooling water inlet to empty the cooling water circuit

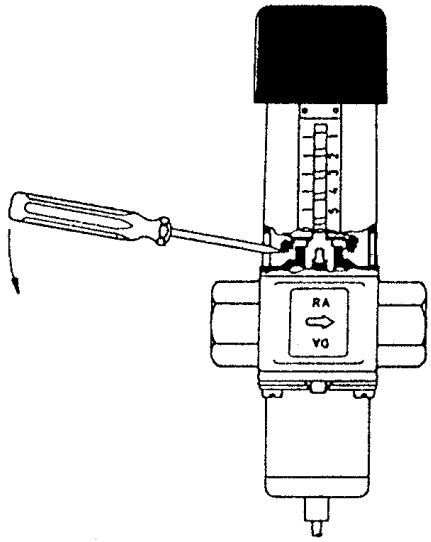


Fig 1-1
Cooling water flow regulator

1) option
2) climatic test systems only

1.4 Maintenance

The water-cooled condenser is protected by a dirt filter → *Fig 1-2 (page 4)* which must be checked regularly for impurities and cleaned as follows (the frequency depends on the water quality):

- Shut off the cooling water inlet
- Open the lateral panels
- Open the screw connection (1) with an open-ended spanner, holding the dirt filter in place with a suitable tool (pipe wrench or open-ended spanner) to prevent distortion.
- Remove the dirt filter (2) and clean it with water
- Reassemble in reverse order

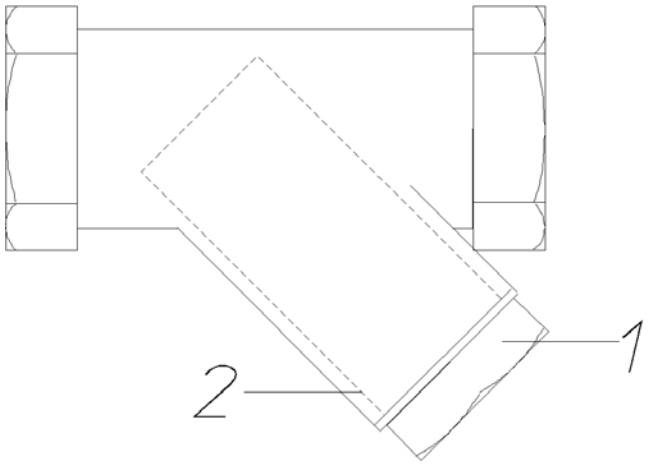


Fig 1-2
Dirt filter

1) option
2) climatic test systems only

APPENDIX: INDEX

1) option
2) climatic test systems only

L

M

N

O

P

R

S

T

GB VCL10EH032005
Buch_GB 032005SIX.fm

1) option
2) climatic test systems only

W

1) option
2) climatic test systems only

1) option
2) climatic test systems only

GB VCL10EH032005
Buch_GB 032005SIX.fm

Vötsch
Industrietechnik

Vötsch Industrietechnik GmbH
Umweltsimulation • Wärmetechnik

Frommern, Beethovenstraße 34
D-72336 Balingen

Postfachadresse:
Postfach 10 04 53, D-72304 Balingen

Telefon: (07433) 303-0
Telefax: (07433) 303-112

Printed in Germany

Vötsch Industrietechnik

OPERATING MANUAL

»MINCONTROL« CONTROL UNIT

FLASH VERSION 00.30 OR HIGHER

63837054 GB 04.2006

Passwords

If you wish to protect the passwords against access by third parties, please remove this sheet and keep it in a secure place.

- Observe the instructions in Chapter → *2.3 Lock / unlock control unit (Page 4)*

Two passwords are set at the factory:

 - User Password

 - Superuser Password

- For the USER password, press  x 2,
- confirm the input by pressing  .

TABLE OF CONTENTS

1) Option
2) Only climatic test cabinets

1) Option
2) Only climatic test cabinets

APPENDIX **INTERFACE PROTOCOL**

APPENDIX **INDEX**

1) Option
2) Only climatic test cabinets

1) Option
2) Only climatic test cabinets

1 INTRODUCTION

1.1 General information

In addition to this operating manual, you will also receive a separate manual for the machine. This operating manual will provide you with all the additional information you need to be able to operate the control unit.

CAUTION

Please read the machine operating manual and observe the safety instructions before operating the machine.

The control unit offers you the following options:

– Control and monitoring of a machine

– Perform testing in auto mode

– Individual test monitoring using adjustable alarm limits

– Error messages display

– Operating hours display

– Interface protocol selection for communication and control of test cabinets with an external PC.

If this is the first time that you have used the machine, we recommend that before you start, you gain an overview of the device:

• First read the Chapter → *An overview (Page 3)*.

  This will give you an overview of the symbols, analog and digital channels commonly used.

1) Option
2) Only climatic test cabinets

1.2 For your information

Warnings in these operating instructions are explained by means of text and adjacent symbols.

DANGER
is used in instances where any failure to comply with instructions could endanger human or other life, or might pose a threat to the environment.

CAUTION
is used in instances where any failure to comply with instructions could cause damage to equipment or the item being tested.

NOTE
is used to draw attention to a piece of advice.

1) Option
2) Only climatic test cabinets

2 AN OVERVIEW

2.1 Start procedure

The start procedure begins once you have turned the main switch to position "I". The control unit starts "booting". »WAIT«, »Start«, the version number and »Off« appear consecutively after approximately 60 seconds.

2.2 Control panel

The control panel consists of a two-line display with a permanently lit background and five function keys.

Fig 2-1
Control panel

A Status line

B Menu line

C Function keys

2.2.1 Display

Two modes can be displayed: the display mode and the operating mode. The data displayed in the status line and the menu line changes depending on the programmed mode.

In display mode, only values can be displayed. To change values, you will have to switch to operating mode.

1) Option
2) Only climatic test cabinets

2.2.2 Function keys

There are five function keys next to the display. The keys have the following meanings:

Function key	Meaning
Arrow keys 	- Browse in display mode - Select the menu functions in operating mode - Save the input value
+ / - keys 	- Change a value to be edited
Enter key 	- Switch to operating mode - Confirm an entry

2.3 Lock / unlock control unit

The »Lock« function →*4.2.2 (Page17)* can be used to lock the user interface.

The lock can be released by entering a password.

There is one password for the user and one for the superuser.

The two passwords are contained in a separate envelope supplied together with this operating manual when the machine is delivered.

NOTE

To protect the control unit against unauthorised access, keep the passwords in a secure location.

NOTE

System parameters can only be changed by the superuser.

2.3.1 Enter password

Use the function keys to enter the password.

- enter the password by pressing the corresponding keys
  → The passwords are stated on the page after the cover sheet.
- and confirm the input by pressing  .

NOTE

*Each time a digit is entered, a * appears in the status line.*

1) Option
2) Only climatic test cabinets

2.4 Menu layout

The table below provides an overview of the menus. After you have selected a mode, the menus appear in the sequence shown in the table.

Category		Menu/Display	Page
Special functions		Print chamber information	→ 18
System parameters (these parameters can only be changed if you are logged in as the superuser)		Select language	→ 16
		Powerfailtime	→ 16
		Powerfailtolerance	→ 15
		Operating mode	→ 14
		Baudrate	→ 14
		Protocol	→ 13
		Address	→ 12
		Printer mode	→ 12
Special functions		Printing	→ 17
		Lock	→ 17
		Quit all error	→ 17
 Input mode			
Control variables (No. machine-dependent)		Temperature [°C]	→ 22
		Humidity [%rH][2)]	
Control outputs (No. machine-dependent)		Fan speed[1)]	
Digital channels (No. machine-dependent)		Start	→ 23
		Humidity[2)]	
Alarm limits		Temperature MIN [°C]	→ 19
		Temperature MAX [°C]	
		rel. humidity MIN [%rH][2)]	
		rel. humidity MAX [%rH][2)]	

1) Option
2) Only climatic test cabinets

2.5 Entering numerical values

If you are required to enter a numerical value, the corresponding digits will start flashing on the panel.

- Use  and  to change the first digit of the number. Press  to move to the next digit.

After the last digit of the number, press the  key to confirm the entry and then either return to display mode or switch to another menu using   .

2.6 Operation

The machine can be operated in three modes: Automatic, manual and input mode.

2.6.1 Manual mode

In manual mode, all of the necessary setpoints, control outputs and digital channels for a test are set by hand. Furthermore, system parameters, special functions and limit values can be set.

- Please refer to chapter → *2.4 Menu layout (Page 5)*

2.6.2 Start mode

This mode is a simplified start procedure to start the machine with only a minimal number of settings.

All of the necessary values are automatically queried in sequence.

If you wish to make additional inputs during operation, this can be done using the input menu.

- Please refer to chapter → *5 Manual mode (Page 21)*

2.6.3 Input menu

You can make additional settings during operation using the input menu. For example, you can switch digital channels on and off, or change setpoints.

2.6.4 Automatic mode

In automatic mode, the test is specified by a test program
→ *7 Automatic mode (Page 27)*.

1) Option
2) Only climatic test cabinets

2.7 Analog channels

There is at least one analog channel (for the »Temperature« control variable). The number of analog channels assigned depends on the equipment of the machine.

2.8 Digital channels

The digital channels are used to switch control functions and devices on and off.

In manual mode, all of the necessary digital channels must be switched on by hand → *5.2.2 Switching digital channels on/off (Page 23)*.

In automatic mode, the digital channels are specified by the program.

The number of assigned digital channels depends on the equipment of the machine.

1) Option
2) Only climatic test cabinets

1) Option
2) Only climatic test cabinets

3 DISPLAY MODE

The operating modes and relevant details are displayed in the display mode.

If you do not switch to the operating mode or enter any data there, the display mode will reappear after a few seconds.

3.1 Display with no test

If the machine is switched off, you can use the  keys to call up the following displays:

A Status line: OFF
Menu line: Software version and operating hours

B Status line: Actual temperature
Menu line: Setpoint temperature

3.2 Display during a test

The following values are displayed in the respective operating mode during a test:

3.2.1 Manual mode

In manual mode you can use the  keys to call up the following displays:

A Status line: ON
Menu line: Operating hours

B Status line: Actual temperature °C
Menu line: Setpoint temperature °C

C Status line: Actual humidity r.h.%[2)]
Menu line: Setpoint humidity r.h.%[2)]

3.2.2 Automatic mode

In automatic mode you can use the  keys to call up the following displays:

A Status line: AUTO
Menu line: Name of the program

B Status line: AUTO
Menu line: Run or PAUSE

C Status line: AUTO
Menu line: Run time of the program

D Status line: Actual temperature °C
Menu line: Setpoint temperature °C

E Status line: Actual humidity r.h.%
Menu line: Setpoint humidity r.h.%

1) Option
2) Only climatic test cabinets

1) Option
2) Only climatic test cabinets

4 SYSTEM PARAMETERS AND SPECIAL FUNCTIONS

4.1 System parameters

NOTE

Entries for system parameters can only be made by the superuser.

4.1.1 Setting system parameters

The system parameters are always set using the following procedure.

Example: Select language

- Press to change to operating mode.
- Press to change to »Manual« and confirm with .
- Press to switch to the »Select language« menu.

- Set the desired language using .
- Confirm the entry with or switch to another menu.

1) Option
2) Only climatic test cabinets

4.1.2 Printer mode

You must select the connected printer type from the printer menu. You can print data on any of the following printers:

– EPSON 24Pin BW (= 24 dot matrix printer; black/white)

– EPSON 9Pin BW (= 9 dot matrix printer; black/white)

– EPSON 9Pin Col (= 9 dot matrix printer; color)

– HP BW (=DeskJet printer; black/white)

– HP Color (=DeskJet printer; color)

Fig 4-1
Printer mode special functions

→ *4.1.1 Setting system parameters (Page 11)*

4.1.3 Bus address

This function allocates an address (number) to the machine. This is especially useful if you have several test cabinets and they communicate with a PC. The address also appears on the printouts. The numbers 1 to 32 are available.

Fig 4-2
Bus address

→ *4.1.1 Setting system parameters (Page 11)*

1) Option
2) Only climatic test cabinets

4.1.4 Protocol

This chapter only relates to external communication with the controller → *Operating mode (Page 14)*.

Several interface protocols are provided. Only one interface protocol can ever be set at one time. → *Appendix: Interface protocol*

Protocols	Comment
ASCII-1	Compatible with DMR and ProdiconPlus
ASCII-2	Compatible with CTC and TC
J-bus	For communicating with SIMPATI[1)]
LogiCAD ODT serial	Only for service; for communication with LogiCAD
LogiCAD ODT tcp	Only for service; for communication with LogiCAD
J-Bus TCP/IP	TCP/IP communication with SIMPATI[1)] with Simcon/Net controller

Fig 4-3
Selecting the interface protocol

→ *4.1.1 Setting system parameters (Page 11)*

Further information → *Appendix: Interface protocol*

NOTE
If you use the SIMPATI[1)] software or the SIMPATI "Program tool"[1)] you must set the J-bus protocol and the baud rate to 19,200.
If you write your own programs for the PC, select either ASCII-1 or ASCII-2.

1) Option
2) Only climatic test cabinets

4.1.5 Baudrate

This chapter only relates to external communication with the controller → *Operating mode (Page 14)*.

The baud rate specifies how fast the data is transmitted from the control unit to the output device and vice versa.

Possible settings: 9600, 19200, 38400, 57600 baud

Fig 4-4
Baud rate

→ *4.1.1 Setting system parameters (Page 11)*

4.1.6 Operating mode

The controller is able to communicate with the control unit as well as with a PC.

NOTE
A setting on the control unit determines whether values can only be specified on the control unit or from the PC as well.

Internal:

Values can only be specified on the control unit. You can use the PC to record values, but you cannot redefine specified values.

External:

Values can be specified on the control unit and on the PC.

Fig 4-5
Operating mode

→ *4.1.1 Setting system parameters (Page 11)*

1) Option
2) Only climatic test cabinets

4.1.7 Power failure tolerance

The power failure tolerance is the maximum amount by which the actual value may deviate from its nominal value in able to resume the test after a power failure.

The power failure tolerance value refers to the first analog channel (temperature).

Possible settings: 1, 2, 5, 10 or 20 K

Fig 4-6
Power failure tolerance

→ *4.1.1 Setting system parameters (Page 11)*

Besides the temperature, the power failure time must also be within the set range → *Power failure time (Page 16)* in order for the test to be resumed.

Example

Set power failure time: 30 min

Set power failure tolerance: 5 K

The test will only be resumed after a power failure if the following conditions are met:

– The power failure lasted no longer than 30 min.

– Once the power has been restored, the temperature deviates from the setpoint value by less than 5 K.

NOTE

The power failure tolerance is only monitored if the power failure time monitoring → 4.1.8 Power failure time (Page 16) is also activated.

1) Option
2) Only climatic test cabinets

4.1.8 Power failure time

This function enables you to determine whether the test should be resumed after a power failure. If the power supply is restored within the set period, the test is resumed at the point where it was interrupted.

Possible setting: 0, 5, 15, 30, 60, 120 minutes

Setting the power failure time to »Off« deactivates both this function and the power failure tolerance monitoring.

In addition to the power failure time, please also note the power failure tolerance → *Power failure tolerance (Page 15)*.

Fig 4-7
Power failure time

→ *4.1.1 Setting system parameters (Page 11)*

4.1.9 Language selection

The information on the control section can be displayed in German, English or French.

→ *4.1.1 Setting system parameters (Page 11)*

NOTE
The program must be restarted (with the machine's main switch) to fully activate the new language on the display.

1) Option
2) Only climatic test cabinets

4.2 Special functions

4.2.1 Acknowledging errors

An error message appears in the display whenever an error occurs on the machine.

See Chapter → *8.2 Acknowledging errors (Page 30)* for how to acknowledge the error.

4.2.2 Lock

You can use this function to lock the input menu or control access to various functions by means of a password.

- To lock the input menu, switch to the »Lock« menu.
- Press .

  »On« appears in the status line.
- Confirm the input by pressing .

To return to the input menu, proceed as described under → *2.3 Lock / unlock control unit (Page 4)*.

4.2.3 Printing

A graphic printout can be started in the »Printing« menu item.

Fig 4-8
Turn the printer on.

- Press to change to operating mode.
- Press to change to »Manual« and confirm with .
- Press to switch to the »Printing« menu.
- Press to start the graphic printout.

  »On« appears in the status line.
- Press to stop the printout.
- Confirm the entry with or switch to another menu.

1) Option
2) Only climatic test cabinets

NOTE

The graphic printout contains only setpoint and actual values for control variables 1 and 2 (usually temperature and humidity[2]).

NOTE

The printer feed is set permanently to 7.5 mm/hr.

→ *4.1.1 Setting system parameters (Page 11)*

4.2.4 Printing chamber information

You can use this menu to print out machine information.

Fig 4-9
Printing chamber information

NOTE

When the printout is finished, the print function will automatically switch off.

NOTE

The set option bits are also output in plain text in the chamber information printout.

1) Option
2) Only climatic test cabinets

4.3 Setting alarm limits

The machine is automatically switched off if the value exceeds or falls below the alarm limit. Limits can be set for control variables (e.g. temperature and humidity[2)]).

Fig 4-10
Setting alarm limits

- Press ↵ to change to operating mode.
- Press + to change to »Manual« and confirm with ↵.
- Press ▼ to change to the desired alarm limit
- Use + − to alter the first digit of the limit value. Press ↵ to move to the next digit.
- Confirm the entry with ↵ or switch to another menu.

1) Option
2) Only climatic test cabinets

1) Option
2) Only climatic test cabinets

5 MANUAL MODE

5.1 Manual mode

In manual mode, you can enter data for the digital channels, system parameters, control variables and limit values.

- Press  to change to operating mode.
- Press  to change to »Manual« and confirm with  .

Fig 5-1
Manual mode

To start the machine, proceed as follows:

- Enter setpoints for control variables → *Entering setpoints (Page 22)*
- Switch on digital channels → *Switching digital channels on/off (Page 23)*
- Start test with digital channel »Start«

1) Option
2) Only climatic test cabinets

5.2 Control variables and digital channels

5.2.1 Entering setpoints

This menu can be used to define various setpoints for the control variables (analog channels) of the machine.
There is at least one analog channel for the »Temperature« control variable. However, several analog channels can be assigned, e.g. for relative humidity [2)]. The number of analog channels assigned depends on the equipment of the machine.

Fig 5-2
Entering a setpoint (in this case: Temperature)

- Press to change to operating mode.
- Press to change to »Manual« and confirm with .
- Switch to the desired control variable, e.g. »Temperature« using .
- Use and to change the first digit of the setpoint.
  Press to move to the next digit.
- Confirm the entry with or switch to another menu.

1) Option
2) Only climatic test cabinets

5.2.2 Switching digital channels on/off

Using digital channels, feedback control equipment and other equipment can be switched on or off.
The number of assigned digital channels depends on the equipment of the machine. The required digital channels must be switched on to enable you to perform a test.

Fig 5-3
Switching digital channels on/off

- Press to change to operating mode.
- Press to change to »Manual« and confirm with .
- Press to switch to the desired digital channel, e.g. »Start«

  The current operating mode appears in the status line.
- Press to activate the digital channel
- Press to deactivate the digital channel

If you want to perform a test, the digital channel »Start« must be switched on. Once the digital channel has been switched on, the test starts immediately.

NOTE
The digital channels »Adjustm. Temp. low«, »Adjustm. Temp. high« and »Adjustm. Temp. calc.« are only relevant for service.

1) Option
2) Only climatic test cabinets

5.3 Changing setpoints during operation

You can change setpoints for the control variables during operation using the input menu.

- Press  to change to operating mode.
- Press  to change to »Input« and confirm with  .
- Switch to the desired control variable using  .
- Use  and  to change the first digit of the setpoint.
  Press  to move to the next digit.
- Press   to change to another control variable or confirm the entry with  .

5.4 Switching digital channels on/off during operation

You can switch digital channels on and off during operation using the input menu.

- Press  to change to operating mode.
- Press  to change to »Input« and confirm with  .
- Switch to the desired digital channel using  .
- Select »On« / »Off« using   .
- Press   to change to another digital channel or confirm the entry with  .

5.5 Switching off the machine

To end a test in manual mode, proceed as follows:

- Press  .
- Press  to change to »switch off?« »Yes« and confirm with  .

The digital channel »Start« is switched off.

NOTE

All additional digital channels which are switched on remain at »On«. If the machine is switched on again, the functions of these digital channels will also be executed. If necessary, switch these digital channels off using the manual mode.

1) Option
2) Only climatic test cabinets

6 START MODE

The setpoints for the control variables and the corresponding digital channels must be specified in start mode.

The machine is started here as follows:

- Press  to change to operating mode.
- Press   to change to the »Start« menu and confirm with  .

Fig 6-1
Manual mode

All of the necessary values are queried in sequence as follows.

- Enter the setpoint for temperature → *2.5 Entering numerical values (Page 6)*.
- Enter the setpoint for humidity [2)].
- Use   to select whether the digital channel for humidity control is to be switched on.
- Confirm »Yes« by pressing  to switch on the machine.

You can then switch to the input menu if you wish to specify additional setpoints or to switch on additional digital channels.

1) Option
2) Only climatic test cabinets

1) Option
2) Only climatic test cabinets

7 AUTOMATIC MODE

In automatic mode, the test is specified by a test program.

Test programs are stored in the controller of the machine and cannot be created using the control unit.

NOTE

Test programs can be created using SIMPATI[1] software or with the SIMPATI "Program tool"[1] . → Appendix: Interface protocol (Page 1)

7.1 Selecting/starting a program

- Press ↵ to change to operating mode.
- Press − to change to the »Auto« menu and confirm with ↵.

The program selection menu then appears.

Fig 7-1
Automatic mode

- Press + − to select the desired program.

Fig 7-2
Program selection menu

A Program number

B Program name

- Start the program by pressing ↵.

1) Option
2) Only climatic test cabinets

7.2 Aborting/continuing program

If a test program is aborted, all digital channels remain set. Only the program time is stopped.

Aborting

- Press  to change to operating mode.
- Press  to select »Break«.
- Confirm by pressing  .

Fig 7-3
Aborting a program

Continuing

If you want to continue the program, proceed as follows:

- Press  to change to operating mode.
- Confirm »Cont« by pressing  .

7.3 Stopping a program

A test program can be stopped prematurely with the »Stop« function.

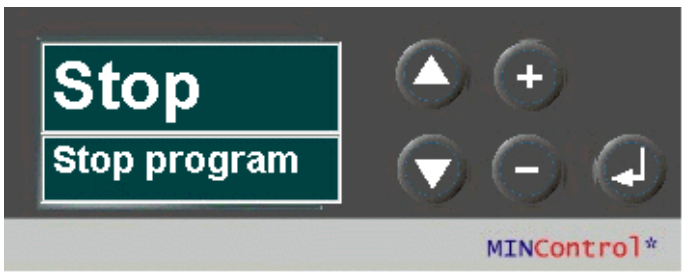


Fig 7-4
Stopping a program

- Press  to change to operating mode.
- Press  to select »Stop«.
- Confirm by pressing  .

1) Option
2) Only climatic test cabinets

8 ERROR MENU

8.1 Calling up the error menu

An error message appears in the display whenever an error occurs.

Fig 8-1
Error messages

If one or more errors occur, they are listed in this menu.

The error code is displayed in front of the error description, e.g. 1:A:31.

	Meaning
1; 2; X...	Sequential numbering
A; W	Error category A = Alarm W=Warning
31; 6; XX..	Number of the error which has occurred

- Also note the Chapter "Error Messages" in the operating manual for the machine.

1) Option
2) Only climatic test cabinets

8.2 Acknowledging errors

Once the cause of an error has been rectified, certain error messages may have to be acknowledged.

- If an error is present, pressing ↵ takes you directly to the »Quit all error« menu.

The number of errors currently present is displayed.

- Press ↵ to acknowledge all errors which have been rectified.

Once the error has been successfully acknowledged, the following appears in the display:

Fig 8-2
Acknowledging errors

1) Option
2) Only climatic test cabinets

APPENDIX: INTERFACE PROTOCOL

If you do not intend to use our PC control software, you will still be able to control the unit from your PC. However you will need some programming knowledge. You will have to write a control program.
Use one of the regular programming languages (e.g. Turbo Pascal or C++)

The unit is equipped with an RS 232 interface. The following characteristics apply for data transmission from the controller to the PC:

– 9600 / 19200 Baud
– 1 Start bit
– 8 Data bits
– 1 Stop bit
– No parity
– No handshaking

NOTE
The INTERNAL / EXTERNAL mode set on the control unit is not supported, i.e. the unit can be operated both via the interface and via the control unit.

1 ASCII-1

1.1 What can you do with your PC?

– Enter and query nominal values for parameters.
– Query actual values for parameters
– Query and change status of the digital channels
– Query the temperature from a variety of standalone measurement sensors [1)]
– start programs
– Specify how many times a program should run
– Stop programs
– Read the error status
– Read the error messages of the unit
– Acknowledge error messages

NOTE
If the unit has more than 2 analogue channels, we recommend using the ASCII 2 protocol, since it provides for easier control of the unit. The same applies if set values (e.g. ventilator speed [1)], blowdown [1)]) are to be set or queried.

1) Option
2) Only climate control units

1.2 How the program works

The program sends a string to the controller. The program uses this send string to request data. The controller responds to this string by sending a response string back to the PC.

WARNING

Communications between the PC and the controller in the unit will not work unless you link the "check sum" »routine« into your control program. *→ 1.4 Program section »Checksum« (Page 6)*

1.2.1 General guidelines for send string

A string contains a series of ASCII characters. Before each send string, you must enter the ASCII character to mark the start of text. After each send string, you must enter the ASCII character to mark the end of text.

Start of text	»start of text {STX}«	ASCII code 02
End of text	»end of text ({ETX})«	ASCII code 03

NOTE

*These characters are omitted in the following examples for simplification purposes. The bus address of the unit is represented by **z** and the checksum to be calculated is represented by **CC**.*

WARNING

The controller processes data slower than a PC. Therefore do not send more than one string per second. Otherwise the processes in the controller (open and closed-loop control) may be disrupted.

1.2.2 General guidelines for response string

The response string contains two extra characters:

{ACK} (acknowledged)	The controller recognised and accepted the send string from the PC.	ASCII code 06
{NCK} (not acknowledged)	The send string was not recognised.	ASCII code 15

1) Option
2) Only climate control units

1.3 Send strings of the ASCII-1 interface protocol

1.3.1 Read actual values

The following string asks for the current status of the unit.

Send string (PC → controller)

The string reads as follows: {STX}z?8E{ETX}

{STX}	
z	Bus address of the unit
?	Request to send
8E	Checksum
{ETX}	

Response string (controller → PC)

The following string contains information on reference and actual values for parameters, together with various other settings.

The string reads as follows:
{STX}1T018.5F066.0P0T000.0#--T010.0F090.0R1000000000000002B{ETX}

{STX}	
1	Bus address of the unit
T018.5	Actual value of parameter 1: 18,5
F066.0	Actual value of parameter 2: 66
P0	Printer is off =0, on =1
T000.0	Temperature on standalone temperature measurement sensor [1)]
#	Unit is switched on = # , switched off = $
--	Number of reported errors (no errors= --)
T010.0	Nominal value of parameter 1: 10
F090.0	Nominal value of parameter 2: 90
R1000000000000000	Digital channels: off =0, on =1
2B	Checksum
{ETX}	

1.3.2 Set nominal values for parameters

The following string sets the nominal value for parameter 1 to 25 and the nominal value for parameter 2 to 35 and starts operatioin.

Send string (PC → controller)

zT025.0F35R1100000000000000CC

Response string *(*Controller → PC*)*

z{ACK}CC	the string was accepted
z{NAK}CC	the string was not accepted e.g. because a nominal value was above or below the set limit.

NOTE

The send string always consists of nominal values for two parameters as well as 16 digital channels. For units with one parameter, the second parameter is ignored.

1) Option
2) Only climate control units

1.3.3 Querying temperature from standalone measurement sensors [1)]

The following string reads the measured temperature value from standalone temperature measurement sensors [1)].

Send string (PC → controller)

z:Get:P_Var:xxx:CC

XXX 216, 217, 218 or 219 for temperature sensors 1 to 4

Response string (Controller → PC)

z:Get:P_Var:216:32.5:CC

Actual value temperature measurement sensor 1 (P_Var216) = 32.5°C

1.3.4 Start program

The following string starts a program..

Send string (PC → controller)

z:Set:AutoStart:xxx:CC

XXX 1 to 120 (program number)

Response string (Controller → PC)

z{ACK}CC if the program was started

z{NAK}CC if the program slot is empty

1.3.5 Specifying the number of program repeats

The following string specifies the number of program repeats.

Send string (PC → controller)

z:Set:AutoLoop:xxx:CC

XXX 1 to 9999 (number of program repeats)

Response string (Controller → PC)

z{ACK}CC

1.3.6 Stopping program

The following string stops a running program.

Send string (PC → controller)

z:Set:AutoStop:CC

Response string (Controller → PC)

z{ACK}CC

1) Option
2) Only climate control units

1.3.7 read error status

The following string displays a bit pattern of all current errors.

Send string (PC → controller)

z:Get:Errors:CC

Response string (Controller → PC)

z:Get:Errors: 1:100000000 ... 00000000000000:CC

Cumulative error	1	there is still at least one error present
	0	there is no error present

The following 64-place bit pattern displays the fault messages still present, read from left to right. A "1" in the far left of the bit pattern therefore means that error No. 1 is still there.

1.3.8 Reading error messages

The following string reads the error message of an error number.

Send string (PC → controller)

z:Get:ErrorText:xx:CC

xx	Number of the error message whose text should be read

Response string (Controller → PC)

z:Get:ErrorText:xx:Errortext:CC

e.g.: z:Get:ErrorText:16:Power fail:<CC>

or

z{NAK}CC if the error message does not exist

1.3.9 Acknowledge the fault.

The following string acknowledges all reported, acknowledgeable errors.

Send string (PC → controller)

z:Set:ErrorQuit:CC

Response string (Controller → PC)

z{ACK}CC

1) Option
2) Only climate control units

1.4 Program section »Checksum«

The checksum is the complement of the Modulo-256 remainder following the division of the ASCII values of all the characters in the string; the values for ETX and the checksum itself are not included.

Each send string must contain a checksum!

NOTE

The checksum is a way of cross-checking the ASCII values in a string, including the ASCII value of »STX«. The ASCII value for »ETX« and the checksum are not included. The checksum is shown in upper case characters, e.g. 8E.

Programming language: C++

```
const char ASCII[ ]= "0123456789ABCDEF";

char *Checksum (char *buffer)

{
    static char Hex[10];
    static int a1, a2;
    register unsigned int i;
    int sum;

    sum = 256;
    for ( i=0 ; i<strlen(buffer) ; i++ )

    {

        sum-=buffer[i];
        if ( sum<0 )
        sum+= 256;

    }

    a1 = (sum & 0xF0) >> 4;
    a2 = sum & 0x0F;
    Hex[0] = ASCII[a1];
    Hex[1] = ASCII[a2];
    Hex[2] = 0;
    return(Hex);

}
```

NOTE

To verify that the checksum has been calculated correctly, use the example of the send string in Chapter → 1.3.1 Read actual values (Page 3). You must obtain »8E« for the checksum.

The controller checks the checksum of the send string to prevent transmission errors.

1) Option
2) Only climate control units

2 ASCII-2

2.1 What can you do with your PC?

– Set and query nominal values for parameters.
– Query actual values for parameters
– Query and change status of the digital channels
– Set change rates for fluctuating nominal values [1)]
– Starting and stopping programs
– Reading error messages
– Acknowledge error messages

2.2 How the program works

The program sends a string to the controller. The program uses this send string to request data. The controller responds to this string by sending a response string back to the PC.

2.2.1 General guidelines for send string

A string contains a series of ASCII characters. Before each send string, you must enter the ASCII character to mark the start. After each send string, you must enter the ASCII character to mark the end.

Start	´$´	ASCII code 36
End	<CR> Carriage Return	ASCII code 13

WARNING

The controller processes data slower than a PC. Therefore do not send more than one string per second. Otherwise the processes in the controller (open and closed-loop control) may be disrupted.

1) Option
2) Only climate control units

2.3 Send strings of the ASCII-2 interface protocol

2.3.1 Read actual values

The following string asks for the current status of the unit.

Send string (PC → controller)

The string reads as follows: $01I<CR>

$	
01	Bus address of the unit
I	Request to send the actual status
<CR>	

2.3.2 Response string (Controller → PC) for a unit with 2 parameters

The following string contains nominal and actual values for temperature and humidity[2)] together with various other parameters.

The values are instantaneous values:

The string reads as follows:

0023.0 0020.5 0050.0 0041.0 0080.0 0080.0 0000.0 0020.0 0000.0 0020.2 0000.0 0020.3 0000.0 0020.4 01101010101010101010101010101010 <CR>

0023.0	Nominal value of parameter 1
0020.5	Actual value of parameter 1
0050.0	Nominal value of parameter 2
0041.0	Actual value of parameter 2
0080.0	Set value 1
0080.0	Set value 1
0000.0	Not used
0020.0	Actual value Pt100-1 (°C, analogue I/O card) [1)]
0000.0	Not used
0020.2	Actual value Pt100-2 (°C, analogue I/O card) [1)]
0000.0	Not used
0020.3	Actual value Pt100-3 (°C, analogue I/O card) [1)]
0000.0	Not used
0020.4	Actual value Pt100-4 (°C, analogue I/O card) [1)]
0 1 1	Unused digital output 0 digital output 1 digital output 2
01010101010101010101010101010	Other digital outputs
<CR>	

1) Option
2) Only climate control units

2.3.3 Set nominal values for parameters

The following string sets the nominal value for parameter 1 to 25 and the nominal value for parameter 2 to 50 and starts operation.

The string reads as follows:

$01E 0023.0 0050.0 0080.0 0000.0 0000.0 0000.0 0000.0 011 0101010101010101010101010101010 <CR>

$01E	
0023.0	Nominal value of parameter 1
0050.0	Nominal value of parameter 2
0080.0	Set value 1
0000.0	Not used
0000.0	Not used
0000.0	Not used
0000.0	Not used
0 1 1	Unused digital output 0 digital output 1 digital output 2
0101010101010101010101010101010	Other digital outputs
<CR>	

NOTE

It is important that the nominal values be within their respective limits (e.g. temperature range) or the command will not be carried out correctly. You can find the allowable limit values in the query command described in → 2.3.8 (Page 11).

NOTE

32 digital channels are always transmitted. If the controller has fewer outputs, the non-existent channels are shown as 0. Each nominal analogue value is separated with a space.

1) Option
2) Only climate control units

2.3.4 Setting change rates [1)]

The following string allows you to set gradients for the change rate of nominal values. For both temperature and relative humidity, two gradients are set for heating/cooling and humidifying/dehumidifying respectively.

The string reads as follows:

$xxU aaaa.a bbbb.b cccc.c dddd.d <CR>

aaaa.a	Heating gradient
bbbb.b	Cooling gradient (positive sign symbol!)
cccc.c	Humidifying gradient
dddd.d	Dehumidifying gradient (positive sign symbol!)
xx	Unit address (1 to 32)

2.3.5 Starting and stopping programs

The following string starts a program..

Send string (PC → controller)

$xxPyyyy<CR>

xx	Bus address of the unit (1 to 32)
yyyy	Program number (1 to 120)

Response string (Controller → PC)

0 <CR>if the program could be started

A running program can be stopped with the following string:

Send string (PC → controller)

$xxP0000<CR>

xx	Bus address of the unit (1 to 32)

1) Option
2) Only climate control units

2.3.6 Reading error messages

The following string always displays the first appearing error with error number and error text.

Send string (PC → controller)

$xxF<CR>

xx Bus address of the unit (1 to 32)

Response string (Controller → PC)

<Error number><Empty spaces><Error text><CR>

e.g.: 16 Power fail<CR>

or:

0 <CR>if there are no errors present

NOTE

Only the first error is displayed in each case.

2.3.7 Acknowledge error messages

The following string acknowledges all errors.

Send string (PC → controller)

$xxQ<CR>

xx Bus address of the unit (1 to 32)

Response string (Controller → PC)

xx<CR>

xx Number of errors still present

2.3.8 Description of the I- and E-rate of special units

The query can be made via the hyperterminal, for example, taking into account the interface setting (→ *Page 1*), by entering $xx?.

This function is only available for units with software versions S!MCON/32-Net 0028t.bin or later.

The structure of the strings, the limits of the nominal values and set values, and the digital channels for the special units are displayed. The output of the analogue and digital channels is in the language set in the control unit using the designations saved in the contoller.

Send string (PC → controller)

$xx?

xx Bus address of the unit (1 to 32)

1) Option
2) Only climate control units

Example of a response E-string (Controller → PC) with two parameters (SPS: K47_60150_C04), (Flash-Version S!MCON/32-Net 0028t.bin)

$01I<CR>

$01E CV01 CV02 SV01 MV01 MV02 MV03 MV04 DO00 DO01 DO02 DO03 DO04 DO05 DO06 DO07 DO08 DO09 DO10 DO11 DO12 DO13 DO14 DO15 DO16 DO17 DO18 DO19 DO20 DO21 DO22 DO23 DO24 DO25 DO26 DO27 DO28 DO29 DO30 DO31 <CR>

CV01 value min: -85.0 value max: 180.0 Temperature	Control variable
CV01 value min: 10.0 value max: 98.0 Humidity	Control variable
CV01 value min: 30.0 value max: 100.0 Fan speed	Set value
MV01 0000.0 unused	Measured value
MV01 0000.0 unused	Measured value
MV01 0000.0 unused	Measured value
MV04 0000.0 unused	Measured value
DO00 unused	Digital channel
DO01 Start	Digital channel
DO02 Humidity	Digital channel
DO03 Condensation protection	Digital channel
DO04 Capacitive sensor	Digital channel
DO05 Compressed air/GN2	Digital channel
DO06 Regeneration dryer	Digital channel
DO07 Noxious gas	Digital channel
DO08 CO2	Digital channel
DO09 Custom O1	Digital channel
DO10 Custom O2	Digital channel
DO11 Custom O3	Digital channel
DO12 Custom O4	Digital channel
DO13 Adjustm. Temp. low	Digital channel
DO14 Adjustm. Temp. high	Digital channel
DO15 Adjustm. Temp. calc.	Digital channel
DO16 Reserve	Digital channel
DO17 -----	Digital channel
DO18 -----	Digital channel
DO19 -----	Digital channel
DO20 unused	Digital channel
DO21 unused	Digital channel
DO22 unused	Digital channel
DO23 unused	Digital channel
DO24 unused	Digital channel
DO25 unused	Digital channel
DO26 unused	Digital channel
DO27 unused	Digital channel
DO28 unused	Digital channel
DO29 unused	Digital channel
DO30 unused	Digital channel
DO31 unused	Digital channel

$01E 0050.0 0080.0 0090.0 0000.0 0000.0 0000.0 0000.0 01010101010101010101010101010101<CR>

1) Option
2) Only climate control units

Example of a response I-string (Controller → PC) with two parameters (SPS: K47_60150_C04), (Flash-Version S!MCON/32-Net 0028t.bin)

$01I<CR>

CV01 CV01 CV02 CV02 SV01 SV01 MV01 MV01 MV02 MV02 MV03 MV03 MV04 MV04 DO00 DO01 DO02 DO03 DO04 DO05 DO06 DO07 DO08 DO09 DO10 DO11 DO12 DO13 DO14 DO15 DO16 DO17 DO18 DO19 DO20 DO21 DO22 DO23 DO24 DO25 DO26 DO27 DO28 DO29 DO30 DO31

CV01 nominal value Temperature	Control variable
CV01 actual value Temperature	Control variable
CV02 nominal value Humidity	Control variable
CV02 actual value Humidity	Control variable
SV01 set value Fan speed	Set value
SV01 set value Fan speedl	Set value
MV01 unused	Measured value
MV01 actual value Pt100 No.1	Measured value
MV02 unused	Measured value
MV02 actual value Pt100 No.2	Measured value
MV03 unused	Measured value
MV03 actual value Pt100 No.3	Measured value
MV04 unused	Measured value
MV04 actual value Pt100 No.4	Measured value
DO00 unused	Digital channel
DO01 Start	Digital channel
DO02 Humidity	Digital channel
DO03 Condensation protection	Digital channel
DO04 Capacitive sensor	Digital channel
DO05 Compressed air/GN2	Digital channel
DO06 Regeneration dryer	Digital channel
DO07 Noxious gas	Digital channel
DO08 CO2	Digital channel
DO09 Custom O1	Digital channel
DO10 Custom O2	Digital channel
DO11 Custom O3	Digital channel
DO12 Custom O4	Digital channel
DO13 Adjustm. Temp. low	Digital channel
DO14 Adjustm. Temp. high	Digital channel
DO15 Adjustm. Temp. calc.	Digital channel
DO16 Reserve	Digital channel
DO17 -----	Digital channel
DO18 -----	Digital channel
DO19 -----	Digital channel
DO20 unused	Digital channel
DO21 unused	Digital channel
DO22 unused	Digital channel
DO23 unused	Digital channel
DO24 unused	Digital channel
DO25 unused	Digital channel
DO26 unused	Digital channel
DO27 unused	Digital channel
DO28 unused	Digital channel
DO29 unused	Digital channel
DO30 unused	Digital channel
DO31 unused	Digital channel

0050.0 0024.6 0080.0 0066.7 0090.0 0090.0 0000.0 0023.8 0000.0 0022.2 0000.0 0025.5 0000.0 0024.4 01100000000000000000000000000000<CR>

1) Option
2) Only climate control units

Example of a response E-string (Controller → PC) with more than two parameters (SPS: T_2S12_C06), (Flash-Version S!MCON/32-Net 0028t.bin)

$01I<CR>

01E CV01 CV02 CV03 CV04 CV05 CV06 SV01 SV02 DO00 DO01 DO02 DO03 DO04 DO05 DO06 DO07 DO08 DO09 DO10 DO11 DO12 DO13 DO14 DO15 DO16 DO17 DO18 DO19 DO20 DO21 DO22 DO23 DO24 DO25 DO26 DO27 DO28 DO29 DO30 DO31 <CR>

CV01 value min: 1.0 value max: 2.0 Adjustm. Temp. low	Control variable
CV01 value min: -90.0 value max: 250.0 Temp. Basket	Control variable
CV03 value min: 0.0 value max: 250.0 Hotchamber	Control variable
CV04 value min: -85.0 value max: 75.0 Coldchamber	Control variable
CV05 value min: 0.0 value max: 50.0	Control variable
CV06 value min: 1.0 value max: 10000.0 Cycles	Control variable
CV01 value min: 0.0 value max: 5000.0 Def. break	Set value
SV02 value min: 0.0 value max: 1000.0 Defrost	Set value
DO00 unused	Digital channel
DO01 Start	Digital channel
DO02 Temp. Hotchamber	Digital channel
DO03 Temp. Coldchamber	Digital channel
DO04 Reserve	Digital channel
DO05 Control lift	Digital channel
DO06 Reserved system	Digital channel
DO07 Reserve	Digital channel
DO08 CO2/LN2	Digital channel
DO09 Custom O1	Digital channel
DO10 Custom O2	Digital channel
DO11 Custom O3	Digital channel
DO12 Custom O4	Digital channel
DO13 Defrost	Digital channel
DO14 Reserve	Digital channel
DO15 Light test	Digital channel
DO16 Power save period	Digital channel
DO17 Adjustm. Temp. low	Digital channel
DO18 Adjustm. Temp. high	Digital channel
DO19 Adjustm. Temp. calc.	Digital channel
DO20 unused	Digital channel
DO21 unused	Digital channel
DO22 unused	Digital channel
DO23 unused	Digital channel
DO24 unused	Digital channel
DO25 unused	Digital channel
DO26 unused	Digital channel
DO27 unused	Digital channel
DO28 unused	Digital channel
DO29 unused	Digital channel
DO30 unused	Digital channel
DO31 unused	Digital channel

1) Option
2) Only climate control units

Example of a response I-string (Controller → PC) with more than two parameters (SPS: T_2S12_C06), (Flash-Version S!MCON/32-Net 0028t.bin)

$01I<CR>

CV01 CV01 CV02 CV02 CV03 CV03 CV04 CV04 CV05 CV05 CV06 CV06 SV01 SV01 SV02 SV02 MV01 MV02 DO00 DO01 DO02 DO03 DO04 DO05 DO06 DO07 DO08 DO09 DO10 DO11 DO12 DO13 DO14 DO15 DO16 DO17 DO18 DO19 DO20 DO21 DO22 DO23 DO24 DO25 DO26 DO27 DO28 DO29 DO30 DO31 <CR>

CV01 nominal value Basketposition	Control variable
CV01 actual value Basketposition	Control variable
CV02 nominal value Temp. Basket	Control variable
CV02 actual value Temp. Basket	Control variable
CV03 nominal value Hotchamber	Control variable
CV03 actual value Hotchamber	Control variable
CV04 nominal value Coldchamber	Control variable
CV04 actual value Coldchamber	Control variable
CV05 nominal value	Control variable
CV05 actual value	Control variable
CV06 nominal value Cycles	Control variable
CV06 actual value Cycles	Control variable
SV01 set value Def. break	Set value
SV01 set value Def. break	Set value
SV02 set value Defrost	Set value
SV02 set value Defrost	Set value
MV01 Temp. specimen	Measured value
MV02	Measured value
DO00 unused	Digital channel
DO01 Start	Digital channel
DO02 Temp. Hotchamber	Digital channel
DO03 Temp. Coldchamber	Digital channel
DO04 Reserved	Digital channel
DO05 Control lift	Digital channel
DO06 Reserved system	Digital channel
DO07 Reserve	Digital channel
DO08 CO2/LN2	Digital channel
DO09 Custom O1	Digital channel
DO10 Custom O2	Digital channel
DO11 Custom O3	Digital channel
DO12 Custom O4	Digital channel
DO13 Defrost	Digital channel
DO14 Reserve	Digital channel
DO15 Light test	Digital channel
DO16 Power save period	Digital channel
DO17 Adjustm. Temp. low	Digital channel
DO18 Adjustm. Temp. high	Digital channel
DO19 Adjustm. Temp. calc.	Digital channel
DO20 unused	Digital channel
DO21 unused	Digital channel
DO22 unused	Digital channel
DO23 unused	Digital channel
DO24 unused	Digital channel
DO25 unused	Digital channel
DO26 unused	Digital channel
DO27 unused	Digital channel
DO28 unused	Digital channel
DO29 unused	Digital channel
DO30 unused	Digital channel
DO31 unused	Digital channel

1) Option
2) Only climate control units

1) Option
2) Only climate control units

APPENDIX: INDEX

1) Option
2) Only climatic test cabinets

P

R

S

T

1) Option
2) Only climatic test cabinets

Fisher Scientific Bioblock
Part of Thermo Fisher Scientific
Parc d'innovation - BP 50111 - F67403 illkirch cedex

France
tél 03 88 67 14 14
fax 03 88 67 11 68
bioblock.vente@thermofisher.com
www.bioblock.com

Belgique / België
tél 056 260 260
fax 056 260 270
bioblock.belgium@thermofisher.com
www.bioblock.be

España
tfno 91 515 92 34
fax 91 515 92 35
bioblock.ventas@thermofisher.com
www.es.fishersci.com